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Harriet Hall

Vaccines, Autism, and Pseudoscience

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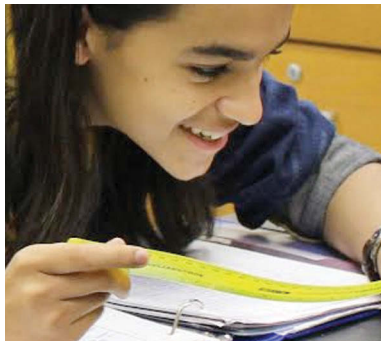

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"… promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

Fake News and Fake Science in the Age of Misinformation

We could say that the whole reason the Skeptical Inquirer exists is to counter misinformation. And in this era of ubiquitous social media and electronic outlets, that is an increasingly tall order. Everybody now has the equivalent of their own printing press, and nearly everyone seems to think they are an expert. One result is a plethora of misinformation. This may indeed be the Age of Misinformation, a term we first used as the theme of our CSICOP conference in 1996, just when widespread public Internet access and email was getting underway. Two decades later, the problem has only intensified.

In this issue, Columbia University professor David J. Helfand surveys the current situation and gives us his guide to "Surviving the Misinformation Age." There is nothing new about misinformation in public life (Helfand gives an example from 2,400 years ago), but modern technologies to send it instantaneously to millions have given it a life of its own. Yet, as he says, facts about the physical world still exist, and for those of us still convinced that rational analysis of those facts has value in understanding that world (what a thought!), a counterattack may be in order. Helfand gives positive advice and guidelines, and they all depend on our using the methods, habits, and values of science ("the most powerful intellectual tool humankind has yet invented") to lead us out of the morass of misinformation.

Helfand has been on the faculty of Columbia's Department of Astronomy for four decades and is a former department chair. A fellow of our Committee for Skeptical Inquiry and a recent president of the American Astronomical Society, Helfand spoke at our 2016 CSICon conference and last year published a seminal book on these topics, *A Survival Guide to the Misinformation Age*. I highly recommend it.

One particular type of misinformation, denialism—and a new form of it at that—is the topic of Harriet Hall's article "Statin Denialism." If you haven't heard of that term before, it's because Hall coined it here to refer to the intentional use of "alternative facts; in other words: lies" and other misinformation to attempt to discredit statins, medications that are helping millions. She gives the evidence. It is a delight to welcome back physician Hall, the "SkepDoc," to our pages for the first time since her recovery from injuries in a fall at Ayers Rock following the Australian Skeptics convention in October.

U.S. Air Force Academy psychology professor Craig A. Foster returns to our pages with "Vaccines, Autism, and the Promotion of Irrelevant Research" (with colleague Sarenna M. Ortiz). They identify "the promotion of irrelevant research"—presenting lists of "questionable or peripherally related research studies"—as a fundamental new tactic being used to make pseudoscience look like science.

As these articles indicate, fake news and fake claims are not new with this latest political cycle. We welcome all those in public life newly aware of such maladies to *our* world in which examining, investigating, and exposing questionable claims and fake science—pseudoscience—has been our very reason for being for a very long time.

—Kendrick Frazier

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Over 150 Scientific Organizations, Sixty-Two Nobel Laureates Urge Repeal of Controversial Immigration Ban

Kendrick Frazier

The American Association for the Advancement of Science (AAAS) and 150 other leading scientific organizations and universities sent a letter to President Trump urging him to rescind his controversial executive order preventing immigration from seven countries. They said it would harm America's science and technology capabilities by discouraging bright students, scholars, scientists, and innovators from coming to the United States to study, attend conferences, work, and build businesses. Nearly a hundred leading high-tech companies also opposed the order on similar grounds.

In addition, an open letter signed by tens of thousands of academics, including sixty-two Nobel laureates, warned that the order "significantly damages American leadership in education and research" (https://notoimmigrationban.com). In a separate statement, the International Council for Science, a group representing scientific bodies in 142 countries, also denounced the ban.

The Center for Inquiry, which publishes the Skeptical Inquirer with the Committee for Skeptical Inquiry, also condemned the executive order on humanitarian grounds, calling it "an outrageous act of cruelty" and saying it "has no basis in facts, reason, or human decency" (http://www.centerforinquiry.net/newsroom/trumps_muslim_ban/).

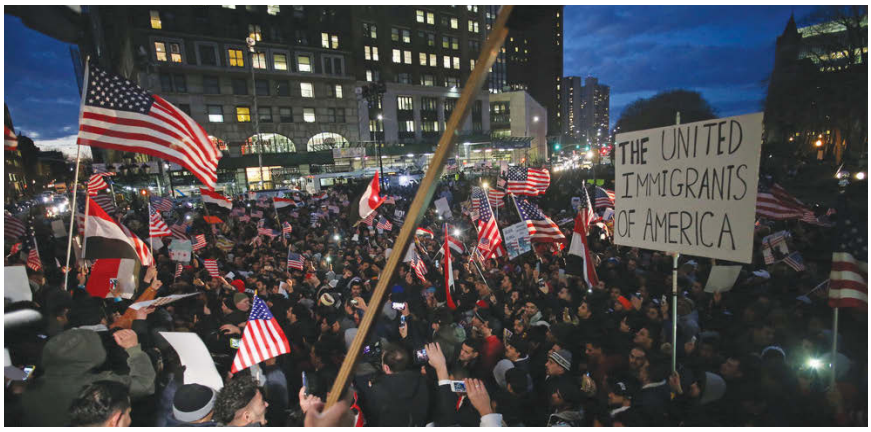
The executive order was quickly stopped by a temporary restraining order from U.S. District Judge James Robart in Seattle, a ruling upheld 3-0 February 9 by the 9th Circuit U.S. Court of Appeals in San Francisco, and immigrants with U.S. visas from the seven countries have been allowed in. In response to the court objections, on March 6 the White House announced a revised travel ban order to take effect in ten days. The new order removed Iraq from the list of affected countries, deleted language that gave advantages to religious minorities (non-Muslims), and said people with green cards and valid U.S. visas would be exempt from the ban. It also allowed for a waiver-seeking process. Critics charged that the essence of the ban remained, and two federal judges put the scaled-back ban on hold.

The letter crafted by AAAS and sent to the president January 31 emphasized the executive order's negative impacts on science and technology. Organizations signing it included the American Anthropological Association, American Astronomical Society, American Chemical Society, American Geophysical Union, American Institute of Aeronautics and Astronautics, American Institute of Physics, and American Psychological Association.

Here is the full text of the letter:

> Dear President Trump:
>
> The January 27, 2017, White House Executive Order on visas and immigration has profound implications for diplomatic, humanitarian, and national security interests, in part because of the negative impact on U.S. science and engineering capacity.
>
> The 151 undersigned organizations—representing a broad spectrum of professional scientific, engineering and education societies, national associations, and universities—are deeply concerned that this Executive Order will have a negative impact on the ability of scientists and engineers in industry and academia to enter, or leave from and return to, the United States. This will reduce U.S. science and engineering output to the detriment of America and Americans.
>
> Scientific progress depends on openness, transparency, and the free flow of ideas and people, and these principles have helped the United States attract and richly benefit from international scientific talent. From the Apollo Program and exploring the far reaches of the universe, to advancing biomedical research for curing diseases and harnessing science to build a thriving high-tech sector, the United States is considered a leader in science, education and innovation. In order to remain the world leader in advancing scientific knowledge and innovations, the U.S. science and technology enterprise must continue to capitalize on the international and multi-cultural environment within which it operates.
>
> The Executive Order will discourage many of the best and brightest international students, scholars, engineers and scientists from studying and working, attending academic and scientific conferences, or seeking to build new businesses in the United States. Implementation of this policy will compromise the United States' ability to attract international scientific talent and maintain scientific and economic leadership.
>
> Today, we urge the Administration to rescind the Executive Order and we stand ready to assist you in crafting an immigration and visa policy that advances U.S. prosperity and ensures strong borders while staying true to foundational American principles as a nation of immigrants.

Kendrick Frazier is the editor of the Skeptical Inquirer.



Chicken Acceleration? APA Puts Imprimatur on Credulous Psi Book

Douglas M. Stokes

The 2017 publication of *Transcendent Mind: Rethinking the Science of Consciousness* by Imants Barušs and Julia Mossbridge (B&M) by the American Psychological Association (APA) represents something of a landmark in parapsychology. For one thing, it carries the imprimatur of publication by the APA. In fact, it is one of only three books listed in the APA's Fall 2016 publications catalog for Basic and Experimental Psychology (the other two books are guides for succeeding in academe). This is an impressive honor for parapsychology, which has been increasingly successful in placing its publications in "mainstream" academic journals, due in large part to Daryl Bem's success in publishing his paper on "feeling the future" in the APA's *Journal of Personality and Social Psychology* in 2010. (See James Alcock, "Back from the Future: Parapsychology and the Bem Affair," and editor's column "Why the Bem Experiments Are Not Parapschology's Next Big Thing," Skeptical Inquirer, March/April 2011.)

The pièce de résistance is an interrogation of the deceased physicist Richard Feynman—as channeled through the medium Angie Aristone.

One might think that this increasing openness to parapsychological articles reflects parapsychology's maturation as a science. However, it could instead be due to a lowering of the APA's scientific standards. The APA is an organization of clinically oriented psychologists, whereas experimentally and scientifically oriented psychologists tend to belong to the rival Association for Psychological Science.

Publication by the APA will give *Transcendent Mind* a high visibility in the academic community, which is unfortunate because the authors adopt an extremely credulous approach to their analysis of the parapsychological literature.

For instance, they enthusiastically cite Lee Polus's seminal paper "From Egg to Chick in 14 Minutes" on the paranormal acceleration of the growth of unfertilized chicken eggs. Here is the relevant excerpt from page 142 of B&M's book:

> Tomaz [a psychic] asked for 15 [unfertilized] eggs to be purchased at the local market and brought to him. Once these had been placed on the table in front of him, he appeared to enter an altered state of consciousness, in which his eyes were "open but unfocused." One by one, he slowly held each of the eggs against his forehead, before cracking them and spilling their contents into a flat bowl. He then hyperventilated with "puffed" chest and "taut and crimson" face" and stretched his arms with "palms down over the eggs." Within 5 minutes, the yolks solidified and darkened until the "fetal forms of baby chicks could be identified". . . At 7 minutes, "the internal organs of the embryos could be seen through thin membranes." And at 9 minutes the cheeping of baby chicks could be heard. Nine of the 15 eggs hatched, four survived longer than 3 days, and a couple of them lived in the backyard until they were eaten for dinner.

B&M state that "a reader could react by thinking that these [events] sound like magic tricks." (You think?) Needless to say, these events were witnessed by multiple observers.

Of course, no parapsychological experiment would be complete without a failure to replicate. One attempt, filmed by an Australian film crew, resulted in only well-defined internal organs. Note that precisely this result could be obtained by cracking incubated *fertilized* eggs and pouring them into a bowl. This is very disappointing, as this research held out the promise of solving the world hunger crisis. A similar trick might have been used in the first experiment.

B&M also cite Stephen Braude's work on the "Gold Leaf Lady," whose primary gimmick was to "materialize" golden leaf paper on her body, clothes, and surrounding objects. Laboratory testing showed that the paper so materialized appeared to be ordinary, commercially available brass foil. It should also be noted that brass foil or aluminum foil can be rolled up in a tiny ball, making it very easy to hide (as well as an excellent prison for dog ticks, by the way). The Gold Leaf Lady's materializations sometimes occurred under poor observational conditions, such as when she was shopping and dining out. For some strange reason, attempts to film the moment of materialization failed. Stephen Braude, it should be noted, is the editor of the *Journal of Scientific Exploration*, one of the major journals in the field of parapsychology, and is a past president of the Parapsychological Association.

B&M attribute partial success in a laboratory psychokinesis experiment to the intervention of "discarnate entities," and they propose that human beings harbor astral bodies and that those astral bodies in turn harbor higher level astral bodies and so on *ad infinitum*. B&M compare this structure to a nested set of Russian dolls.

The pièce de résistance is B&M's interrogation of the deceased physicist Richard Feynman—as channeled through the medium Angie Aristone. B&M state that the medium provided some accurate details of Feynman's life. B&M do not provide these details or any description of the conditions under which they were provided. This line of investigation was prompted by Barušs's reading of Feynman's books on physics. Mossbridge asked Barušs to ask the "Feynman" personality some technical

questions about physics. So Barušs set up another appointment with the medium (who by that time of course had a "heads up" that investigators would ask Feynman-related questions). Barušs asked "Feynman" for the fine structure constant, which most physicists know as 1/137, or .0073 in decimal form. The medium said, "Zero. Eight." At that point, Barušs cut her off by saying "something like 'No. No. That's wrong. That's not the right number.'" Undeterred, the medium stated that "there is a capital M piece of something; attached to something." Barušs replied that there was no capital M anywhere. Later it dawned on him that Mossbridge's name begins with a capital M.

At some point in their conversation, Mossbridge's phone died, leaving the number 0.08 displayed on her phone calculator. (She had been playing around with her calculator in a desperate search for numbers related to the fine structure constant.) At this point, "a light bulb went on" in Barušs's head. He recognized .08 approximating the square root of .0073, the fine structure constant. But .08 is not in fact the fine structure constant, which is .0073. An Internet search revealed that Feynman sometimes called the square root of .0073 (.085) the fine structure constant, although few physicists followed him in this practice. B&M claim that the probability of guessing the first two digits of the (erroneous) fine structure constant (i.e., zero and eight) correctly by chance is 0.01. However, the initial zero is only a placeholder and would not be considered a significant figure in scientific notation. The second digit (eight) is simply wrong. If we are going to consider initial zeros, then the initial digits are both zero in the fine structure constant, and B&M are wrong again.

In conclusion, the publication of B&M's book by the APA may not reflect parapsychology's scientific maturation as a science but rather the erosion of the APA's scientific standards.

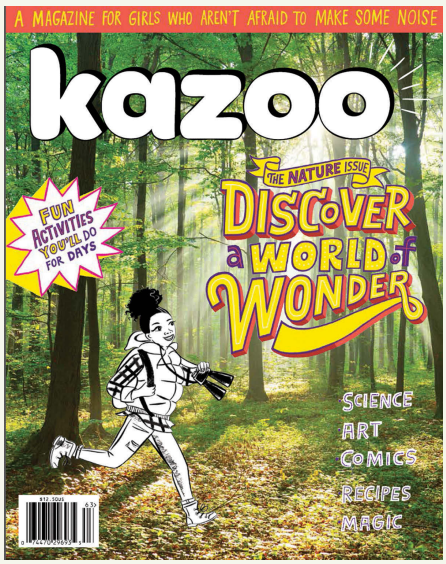
Douglas M. Stokes holds a PhD in experimental psychology and is a frequent contributor to the literature on parapsychology. His latest book is *Reimagining the Soul* published by McFarland.

Kazoo Magazine Aims to Encourage Girls in Science

Benjamin Radford

A crowdfunding project has helped launch a new magazine, *Kazoo*, to empower girls and (in part) help steer them toward science, technology, engineering, and mathematics (STEM) careers. *Kazoo* focuses on girls and women, and, according to its website:

> All of our stories are either developed or inspired by top female artists, explorers, scientists, chefs, athletes, activists, writers and others. Regular features include: science experiments; comics; art projects; recipes; interviews with inspiring women from Olympic athletes to astronauts; and fun activities, like secret codes, jokes, mazes, search-and-finds and more. . . . It will feature some of the most powerful and inspirational women in their fields, thus giving girls a more well-rounded sense of the world and the possibilities within it.



Touted as "a magazine for girls who aren't afraid to make some noise," the website notes, *Kazoo* isn't just for girls: boys would "probably love it, too. After all, there's no such thing as, say, girls' science and boys' science, or girls' art and boys' art. Science is science and art is art, of course. But most media that cover similar topics use boys as the default target audience, while girls are left with the burden of just 'putting themselves in the story.'"

Founder Erin Bried explains that she and her five-year-old daughter were looking for a magazine they could enjoy together but were dissatisfied with what was available. Bried drew upon nearly twenty years of experience in high-profile magazines, including *Self* and *Glamour*, and in April 2016 launched a Kickstarter campaign "with hopes that other people would also be as interested in a magazine that doesn't tell girls how to look or act, but instead inspires them to be strong, smart, fierce and, above all, true to themselves. Within 30 days, *Kazoo* became the most successful journalism campaign in crowdfunding history." (Full disclosure: I contributed to *Kazoo*'s campaign.)

The theme of *Kazoo*'s most recent issue (Winter 2016/2017) is architecture, and it features blueprints for making a snow fort and a bridge made of candy, a comic about the Brooklyn Bridge, a city scavenger hunt, ice science experiments, a banana bread recipe, and more. *Kazoo*, which carries no advertising, is available only in screen-free print form (since its pages contain art projects and puzzles) and costs $50 per year for four issues. Subscriptions are available at https://www.ezsubscription.com/kaz/subscribe.

Benjamin Radford is deputy editor of Skeptical Inquirer and author or coauthor of ten books.

Library Catalogs Deny Science Denial

Sanford Berman

Many libraries stock works such as Donald Prothero's *Reality Check: How Science Deniers Threaten Our Future* (2013), Stephen Epstein's *Impure Science: AIDS, Activism, and the Politics of Knowledge* (1996), Chris Mooney's *The Republican War on Science* (2005), Nicoli Nattrass's *Mortal Combat: AIDS Denialism and the Struggle for Antiretrovirals in South Africa* (2007), Seth Kalichman's *Denying AIDS: Conspiracy Theories, Pseudoscience, and Human Tragedy* (2009), Pieter Fouri and Melissa Meyer's *Politics of AIDS Denialism: South Africa's Failure to Respond* (2010), Nicoli Nattrass's *The AIDS Conspiracy: Science Fights Back* (2012), John Cook's *Climate Change Denial* (2011), Naomi Oreskes and Erik M. Conway's *Merchants of Doubt* (2011), Robert Kenner's 2015 documentary film *Merchants of Doubt*, Michael Specter's *Denialism: How Irrational Thinking Hinders Scientific Progress, Harms the Planet, and Threatens Our Lives* (2009), Hannah Allen's *Don't Get Stuck! The Case Against Vaccinations and Injections* (1985), Paul A. Offit's *Deadly Choices: How the Anti-Vaccine Movement Threatens Us All* (2010), Mark A. Largent's *Vaccine: The Debate in Modern America* (2012), Paul A. Offit's *Autism's False Prophets: Bad Science, Risky Medicine, and the Search for a Cure* (2008), PBS's *Frontline* documentary *Vaccine War* (2010), Viera Scheibner's *Vaccination: 100 Years of Orthodox Research Shows That Vaccines Represent an Assault on the Immune System* (1993), and Eleanor McBeans's *Poisoned Needle* (1957).

But if you don't already know the author or title and so make a subject search in the online catalog under "Science Denialism," "AIDS Denialism," "Climate Change Denialism," or "Antivaccine Movement," you will likely find . . . nothing. It will seem that the library doesn't really have such materials, although they *do*.

Why? Because the Library of Congress has not recognized these topics as subject headings. Since most American libraries (and many others) will not assign headings (i.e., access points) to relevant resources in their collections unless the Library of Congress has done so first, the practical effect is that the subject searches in nearly all catalogs will not reveal items on AIDS, science, and climate change denial, as well as the antivaccine movement, despite their having resources on these themes.

In order to improve access for interested citizens and scholars to such "denialism" books, films, and documents, the Library of Congress must create and then currently and retrospectively assign appropriate descriptors to cataloged materials. I (and perhaps others) have formally asked them to do so. Thus far, they haven't.

What might help in persuading the Library of Congress to establish and use these needed rubrics is a statement from the Center for Inquiry urging such action. Support letters from individual CSI members, plus Skeptical Inquirer and *Free Inquiry* readers, would also be helpful. Correspondence should be directed to:

Cataloging Policy & Support Office
Library of Congress
Washington, DC 20540-4305

For background on the "currency" and other problems in Library of Congress subject and descriptive cataloging, see my *Joy of Cataloging* (1981); "Jackdaws Strut in Peacock's Feathers: The Shame of 'Standard' Cataloging," *Librarians at Liberty*, June 1998, p. 1, 4–21; and quarterly "Berman's Bag" columns in the *Unabashed Librarian*. Also, *Prejudices and Antipathies: A Tract on the LC Subject Heads Concerning People* (1993 edition).

Sanford Berman, former Head Cataloger at Hennepin County Library in Minnesota, is an advisor for the *Journal of Information Ethics*. His latest book is *Not in My Library: 'Bermans Bag' Columns from the Unabashed Librarian, 2000–2013* (2013).

Information Bias in Library Catalogs

Timothy Binga

Sanford Berman (see preceding News and Comment piece) has been working tirelessly for years to improve the Library of Congress Subject Headings (LCSH) and keep the subject headings and classification system up to date. As mentioned in his article, Berman points out a subtle bias that is created because library catalogs do not truly represent the subject heading and classification that is indicated. His example of climate change denialism is but one classification that should be added, and it is not correctly represented with the term *climate change skepticism*.

As Berman mentions, the Library of Congress is slow to make changes. This is not only because they are a conservative institution but because they are undergoing a "modernization" of cataloging rules. The Library of Congress is moving toward a new system that will provide many other access points to information than were found in older library catalogs. It still takes considerable effort to make even the simplest of subject heading changes to become more modern, or remove an archaic item, and it seems as though the Library of Congress might not be working as fast as they could to modernize the classification schemes.

Library Information Systems are heading toward more social interaction that allow for tagging materials by patrons. These systems do not necessarily have formal subject headings from the Library of Congress; however, the system is trying to overcome some of these issues, current relevance being one important one. This is done with a social tagging element as both patrons and librarians are using keywords (such as denialism, AIDS denialism, etc.). This is not formalized, which in itself is a problem. Since anybody can tag, there is no control, and there is no guarantee that the tag is relevant to everyone. This also creates another bias.

Knowing there is a bias in the information helps us to think critically about the information that is represented in the library catalogs. As a part of their profession, librarians and information specialists try to remove these biases. But even our profession can sometimes create these problems, both unwittingly and on purpose.

Earl Lee, in his book *Libraries in the Age of Mediocrity* (Jefferson, NC: McFarland and Co., 2001) points out that there have been many issues with cataloging library materials, particularly with those of a controversial nature. The example I use in my article "Library Collections on Unbelief" in the *New Encyclopedia of Unbelief* (Amherst, NY: Prometheus Books, 2007) shows how books dealing with evidence for and against the existence of Jesus are placed incorrectly in the subjects "Atheism" or "Christianity—Controversial literature" versus the correct heading of "Jesus Christ—Historicity." Many reasons could be to blame for this, but Lee points out that this type of book usually is cataloged by a subject expert, which would likely be in religion or philosophy, and there could be a bias there.

Also, many book creators and publishers today are cataloging their own materials, and this becomes a library cataloging issue too. They are using subject headings that are not always correct but ones that would sell books better. We see some of those effects in skeptical book sales; Joe Nickell's University Press of Kentucky books were promoted as paranormal books, placed in the New Age section of Barnes and Noble, and had only secondary subject headings of skepticism. Good librarians might change the subject headings a bit for their own library, but many don't have the time or the ability to do this.

I support the improvement of the LCSH with those suggestions Berman has written about here. Hopefully we will still see information professionals continue to help patrons make informed decisions on what they are looking to read.

Timothy Binga is Director of Libraries at the Center for Inquiry.

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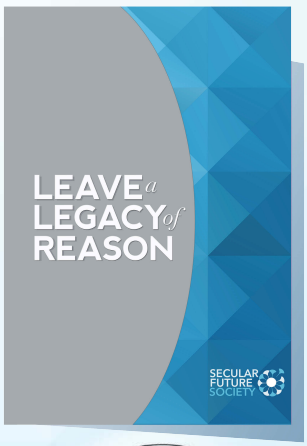

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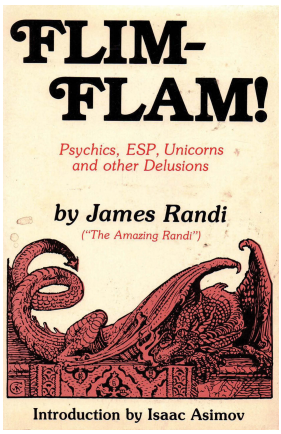
Still 'Amazing': A Conversation with James Randi

Part 2

Part 2: The famous conjuror, investigator, and author—and founding fellow of CSICOP—sat down with Skeptical Inquirer *Editor Kendrick Frazier at CSICon Las Vegas 2016 for a live, ninety-minute onstage conversation. Here are excerpts.*



Which of all of your books is your favorite and which is most successful?

Flim-Flam! was probably the most successful. Yes, with an exclamation point, please, and a hyphen. It's very important. Yes, *Flim-Flam!* really is the most general book on my investigations of the paranormal and the supernatural claims that are still infesting our society today. It sold very, very well. And *The Faith Healers* was a great success for me too.

Tell us about your book that is completed, I understand, but not yet published, *A Magician in the Laboratory*. What is that about?

It's going to deal with my visits to laboratories all over the world in almost every country in the world over these many years that I've had traveling. Where these scientists thought they had something discovered, something paranormal, something supernatural, whatever, I would go into the laboratories and show them where their errors were. They were not very happy about it.

Particularly in Russia. They were not happy about it at all, and I came in for all kinds of scolding. I was told by two of the scientists who were present, young fellows, months afterward I got letters from them saying that the man in charge of the whole thing said they would never let a magician in the laboratory again.

I showed them where they were so wrong. A magician showing scientists where they're wrong? Come on, that's not very logical at all. But I knew enough about science and about the way it works and

doesn't work. That's the second thing you've got to know, is how it *doesn't* work.

When Carl Sagan wrote the introduction to *Faith Healers*, he said many kind things about you, but he also had some criticisms. He referred to you as "crotchety."

I certainly am, yes. He couldn't quite understand that I actually did sometimes get very angry, particularly at so-called faith healers and people who are supposed to be bringing relief to the people.

In November 2014, the *New York Times Magazine* published a lengthy article about you, "The Unbelievable Skepticism of the Amazing Randi." It was quite a wonderful, very detailed, revealing article. How did you see it and how has it affected you?

bunker. He prefers to describe himself as a scientific investigator. I don't set out to debunk." I think that's fair, right?

I am a debunker, yes, by definition, but I think scientific investigator covers it better because I try to be scientific. I don't have the credentials for that at all, but I have met the approval of many leading scientists, including Carl Sagan, and many, many other people around the world in that respect. I accept it. I do try to be as scientific as I possibly can, and I'm not afraid to phone people up and ask them for advice on how I should state something to make sure that I have it as accurately as I can.

FRAZIER: Then the writer talked about this person we have kept in the background here. "Randi's campaign against [Uri] Geller helped make them both more famous than ever. Even today Geller credits Randi with helping him become a psychic phenomenon. 'My most influential and important publicist,' as Geller described him to me.'"

What do I think of that?

Yes.

I think this is, what do they call it, a delusion on the part of Mr. Geller. Yes, a very dramatic delusion. He likes to think of it that way, that I made him, but he was well famous as a so-called psychic long before I was called by *Time* magazine to go in and investigate him. That investigation, that was fun . . . you have no idea. Geller, with his great psychic powers, didn't know that I was a magician and that I knew how he was doing it. How would he not have known that?

At one point Geller bent a spoon and showed it to me. He said, "Did you see that?" I looked at him, I said, "Yes, Mr. Geller, I did see that." He just looked, hesitating. Then he put the spoon down and went on with something else. I think it tipped to him at that moment. That was a revelation to him because I said it that pleasantly: "I did see that."

A biography of you is being written by Massimo Polidoro. How is that going?

I'm a very close friend of Massimo's. I've known him since he was about so big and he's actually lived at my home for some period of time and brushed up on his English while doing that. He's now a famous writer in Italy, his homeland. He writes in both English and in Italian.

I'm pleased to have it in

"I am a debunker, yes, by definition, but I think scientific investigator covers it better because I try to be scientific. I don't have the credentials for that at all, but I have met the approval of many leading scientists, including Carl Sagan, and many, many other people around the world in that respect. I accept it. I do try to be as scientific as I possibly can, and I'm not afraid to phone people up and ask them for advice on how I should state something to make sure that I have it as accurately as I can." —James Randi

It *was* a good article. I liked it very much. At the *New York Times,* after all, you would expect high standards, and we got them.

My partner, Deyvi, and I, we were very, very happy with the results of it. It was done kindly and decently. I was satisfied with it in most ways, and certainly the illustrations were very good. We were very flattered by it.

FRAZIER: Let me mention a few things that were said: "For many of his most zealous followers the opportunity to meet Randi at TAM"—your conference—"may be as close as they will ever come to a religious experience."

That's true. Bless you, bless you.

[Continuing] "He, Randi, said he disliked being called a de-

Massimo's hands. Massimo has agreed to suspend activity on the book because he has so many other projects going all at the same time. He's done very well for himself in that respect. He has agreed to suspend action on that until my next book comes out because it's going to be very much autobiographical as well.

***Magician in the Laboratory*? It'll be autobiographical about your life as well as about your work in scientific laboratories?**

Yes. I got a chance to express that, but Massimo will come out with his version of course from a different point of view. That's quite understandable. He already has written a very, very good book on the history of Harry Houdini, among so many other books.

In 2015, out came a documentary movie about you, *An Honest Liar*. Ruth and I were very privileged to be among the audience in Sydney, Australia, when you were on your Australian tour for the movie after the Australian Skeptics convention there two years ago. I found it a powerful and emotionally moving movie. I assume you agree?

Yes, I do. I must explain, for those who've seen it and for those who haven't, that there was a sequence in there, you'll all remember this, there is a point in the movie when I told the producers about something that happened in my family that I didn't wish to be in the movie. I told them that this must not be used. It was less than twenty-four hours later that I came to my senses, the next day after I had a chance to think about it. I phoned them up and I said, "Wait a minute. I'm supposed to be honest about these things. I can't have it that way. That sequence has got to get back in again, any way you want. Just put it back in again because it's got to be the true story of my life."

It turned out to be that, and the reaction we are getting to it, well, it's now dubbed in eight different languages, subtitles, all over the world. It just showed in Russia I think for the first time, a couple of months ago. It's on Netflix.

How has it changed your life?

In odd ways that you might not realize. Deyvi and I, if we go out to a department store or something, not in our immediate neighborhood, there's always somebody way across the store, "Mr. Randi," and they come running at me. "I saw your movie. I loved it," the whole thing. They recognize both of us of course. It has made a great deal of difference. I feel good because the true story is out there and it's available to everybody. The producers of the film did a very, very good job. All with my approval, I assure you.

That event in Sydney, Australia, that I mentioned. Toward the end you were asked a question from the audience that I thought was very revealing, something about you. I wrote about it later in my editor's column in the Skeptical Inquirer. You were asked how to treat a friend who ardently believes in the paranormal. You said, "Be kind. Be kind. They believe because they need to believe. Be compassionate." Is that a new Randi or is that the Randi of old?

It's not a new Randi at all, but since I began these investigations I found that these people, they believed in it so much and they needed it so much that to disabuse them of the notion was often very difficult to do.

At showings of *An Honest Liar*, we can often drive to them if they're in Florida and show up for Q&A following the film, to some delight. Those are always rather exciting and very good sessions.

When we do these Q&A things afterwards and the audience leaves, there's always six or eight people left behind, Ken, that come to the foot of the stage. They look up at us and they'll come up with the same statement as if it were written out there for them to read. They say, "You made a big change in my life," often with tears coming down their faces.

Folks, you cannot buy that. That's the greatest compliment we can possibly have. They will in many cases successfully explain how what we said in that film actually changed their minds in some way or another. As I say, that's very, very flattering, and we know we made it. The film worked and it worked well. We get letters from all over the world now from people who say exactly the same thing. That's very flattering.

I want to ask you about another experience I recall. It was after a CSICOP Executive Council meeting in London. We were at a restaurant. You were bending the cutlery, surprisingly.

Me? Would I do a thing like that?

A waiter was watching very intently, and it became very clear he was quite emotional about it. He eventually came over, and it was clear something was very strongly affecting him. I don't recall whether it was that he had seen you debunking the idea that spoon bending is a paranormal phenomenon—I think that's what it was—or whether he maybe thought you were a paranormal person yourself.

I recall your going over and taking him aside and talking to him privately about that to comfort him. I don't know what was said, but you did do that, and I don't know if you remember that experience at all.

I've had to do that occasionally to explain to people there are ways of doing this and then just do it right in front of their eyes. "How did you do that?" they'll say. "I gestured with the spoon like this and I said to you, 'Come over here.' As I turned away and you didn't notice that then I concealed the bend." I explained to them how I did the thing.

Then it suddenly dawned on them, "Yes, it's very easy actually."

None of us are as young as we used to be. You've had health challenges, a heart attack I believe, colon cancer, something you and I have shared.

I had cardiac bypass surgery.

Cardiac bypass, aneurisms in your leg, cataracts, I don't know what else. Yet you have persevered. I think we all want to know how are you doing health wise?

I've recently had a couple of TIAs; those are transient ischemic attacks. That really stands for a minor stroke. I lost the use of my right arm temporarily, for a matter of a few minutes, but it's back again, yes. As a matter of fact, my hands are exceedingly flexible if you noticed. No, I'm doing very well, doing very well. For eighty-eight I only feel like eighty-six. True.

Thank you, dear Randi. We all thank you.

Joe Nickell, PhD, is a former stage magician, private investigator, and scholar. He has investigated in over two dozen countries and is author, coauthor, or editor of some forty books.

Some Queensland Mysteries

Strange mysteries may be found almost anywhere, but they seem especially plentiful and interesting in Australia. I investigated several during my first (2000) and second (2016) trips Down Under (including New Zealand on the latter). And I only scratched the surface. In addition to the several articles that have resulted—some old and some more recent (e.g., Nickell 2001; 2016)—I offer three diverse mysteries I chanced upon in Queensland: a dramatic event that sparked thoughts of UFOs, a "haunted" historic inn, and an alleged miracle-working saint. Here is my take on each.

Figure 1. Aerial view of the great "sinkhole" at Inskip Point, Queensland, Australia, 2015.

Mystery Hole Down Under

It happened on a Saturday night, September 26, 2015, when something took a monstrous bite out of a beach at Inskip Point north of Brisbane, Queensland, Australia. There was a thunder-like noise, and an entire campsite began to quickly disappear. People escaped with their lives, but some vehicles, including one with an attached "caravan" (camper), were lost to "Davy Jones's Locker" (Gorrie 2015). Alarm spread to nearby campsites, and officials evacuated an initial 140 people, though the number later grew to an estimated 300 (Tran and Thackray 2015).

The incident, as a local newspaper noted, "attracted interest around the world" (Gorrie 2015). Internet sources adapted the story. For instance, *UFO News* asked, "What caused the earth to open and take a huge bite out of Inskip Point?" (Stokes 2015). A psychic even suggested it might be a sign of the Biblical "end times" (Walker 2015). This was enough for Queensland parliament member Tony Perrett to warn against wild speculation, as an investigation into the cause continued ("Call to Stay Calm" 2015).

A couple of weeks later, on October 12, Ross Balch (president of Brisbane Skeptic Society), Myles Power, and I happened to be in the area hunting the fabled Yowie (Australia's Bigfoot). We had been to Yowie Park at Kilcoy (where a wood statue of the elusive man-beast stands [Nickell 2016]) when we received an invitation from Dr. Cassandra Perryman, a psychologist and fellow skeptic, to come to her home at Rainbow Beach not far from the mystery site. She had arranged for local fire captain Greg Haring to meet with us and take us to Inskip Point.

Putting us in his all-terrain vehicle, Haring first gave us a quick tour of Rainbow Beach (which gets its name from its colorful variety of mineral-sand deposits). As the tide was coming in, he would periodically pause to let the water retreat, then—deftly swerving around boulders—make a dash for the next stretch of beach. After this memorable ride, he took us to nearby Inskip Point and the very edge of the great "sinkhole."

It was a stunning scene. A semicircular area of former beach—spanning an estimated 200 by 100 meters and reportedly extending more than 10 meters

deep—held trees that were now standing in the ocean. Aerial photos (see Figure 1) provided an even more impressive view of the phenomenon. (See "Skydivers" 2015; Stokes 2015.)

As it happens, the area has a history of such collapses occurring rather regularly, although they are rarely so large. A sizeable one occurred in 2011 (Stokes 2015). However, these are not the usual type of sinkhole that occurs, for example, when a segment of limestone cavern collapses. (I am familiar with this from my cave exploration days in Kentucky.) In fact, the Inskip beach collapse isn't really a sinkhole at all.

A deposit of sand that becomes overly steep through underwater erosion may become unstable, prone to what is called a submarine landslide. In this event, the slope unravels with segments progressively slumping to fill the space left by the slumping of the segment below. According to an expert source, "This mechanism fits well with the situation at Inskip beach, both in terms of the geomorphological conditions and the reported characteristics of the beach collapse" ("Inskip" 2015).

While the 2015 occurrence is indeed memorable—especially to those who almost lost their lives to it!—it yet fails to provide evidence of some great "unexplained mystery."

The Haunting of Plough Inn

Located at Brisbane's South Bank, the Plough Inn is a hotel and tavern with a long history—and reportedly a resident ghost.

The original building of 1864 was replaced with a more substantial one in 1885. Its picturesque, balconied front is a relic of a streetscape; it once graced Stanley Street (a principal nineteenth-century thoroughfare), but its surroundings have evolved. It was protected when South Brisbane's old wharves were transformed into the scenic, multi-faceted South Bank Parklands. After additions in 1922 and internal transformations to become a tavern during Expo '88, it earned a listing on the Queensland Heritage Register in 1992 (Moore 2014; "Plough Inn" 2015) (see Figure 2).

However, facts about the ghost of Plough Inn are as elusive as the alleged spirit itself. In *The International Directory of Haunted Places*, Dennis William Hauck (2000, 221) refers to the "apparition" of a female there but then states that it "has never been spotted." Still, he says "her distinctive voice has been heard," most frequently "near Room 7." But wait: another source clarifies that she actually "lives . . . where Guest Room 7 *used to be* before the renovations" ("Ghosts" 2005; emphasis added). Anyway, she was "a young girl" or "young woman" who was definitely strangled, either by her "boyfriend" or her publican husband (Horswill and Stead 2009)—unless the latter instead threw her to her death from the exterior balcony as other sources state (e.g., Farrell 2015).

Facts about the ghost of Plough Inn are as elusive as the alleged spirit itself. In *The International Directory of Haunted Places,* Dennis William Hauck refers to the "apparition" of a female there but then states that it "has never been spotted."

Sources that give a time frame for the female's death agree that it was "in the 1920s." We learn that since then "many claim to have heard her" ("Ghosts" 2005) as she "haunts Room 7" (Horswill and Stead 2009) or at least "wanders the hallways and the balcony where she met her end"—although that source calls the claim only a "story" (Moore 2014).

As we see, the story elements (or "motifs," as folklorists call them) are quite variable. Variants are a "defining characteristic of folklore" according to distinguished folklorist (and CSI fellow and friend) Jan H. Brunvand (1978), since oral transmission naturally produces differing versions of the same story. But many of the variants in published ghost tales are explained by writers copying others while adding details and making other changes for literary purposes (Brunvand 2000, 132). I suggest we call such written products *hacklore*. In any case, Brunvand (1981, 21) sagely observes that when there is no certain original, the multiple versions of a tale do provide "good evidence against credibility."

At the Plough Inn, alleged earwitnesses invariably go unidentified, but I did learn from one of the service staff, who had a room upstairs, that he recently heard a knock at his door when no one was there. Alas, such rapping noises are common, often caused by temperature changes and settlings of an old structure (Nickell 2012, 61). Pranks are also known

Figure 2. Historic Plough Inn in Brisbane, Australia: Note author at bottom left, sign at top center.

Figure 3. The oldest church in Queensland—St. Stephens Chapel in Brisbane—is now a shrine to Australia's first saint (Author's photos).

(e.g., Christopher 1970, 170), among other explanations.

Ross Balch and I spent much time at the inn—during dinners, a skeptics-at-the-pub event, and a pleasant lunch with assistant hotel manager Mark Farrell. Farrell (2015) had no personal experiences to relate and said he was himself not really much of a believer in ghosts. I drank to that; indeed, the only spirits Ross and I encountered at the pub were those in bottles and glasses.

Miracle Worker?

During my stay in Brisbane, I was delighted to visit the little chapel of St. Stephen's, which—dwarfed by the adjacent cathedral of the same name—is the oldest church in Queensland, opening in 1850. After it was replaced by the new edifice in 1874, the chapel functioned as a school, survived threats of demolition, and today is a shrine to Australia's first and only saint, Mary MacKillop (1842–1909), canonized by Pope Benedict in 2010 ("St. Stephen's" N.d.) (Figure 3).

Briefly, Mary was the child of Scottish immigrants to Australia. Her mother, during her pregnancy, wore an alleged relic of the True Cross (pieces of which so proliferated in the Middle Ages as to promote extreme skepticism). As a teenager, Mary worked as a stationery shop assistant and later as a teacher and governess, becoming her family's main breadwinner. She soon opened a school for young ladies in western Victoria. In 1866, when she was twenty-four, Mary began operating in a former stable a congregation of religious sisters—teachers and care providers—called the Sisters of St. Joseph of the Sacred Heart. Her intensity in supporting working-class families and her conflict with clergy (including helping to expose a pedophile priest)—led to her brief excommunication and the expulsion of nearly half her followers. This injustice was soon rescinded, and though other troubles befell her, she went on to leave an indelible mark on the Catholic Church in Australia (Steer 2010; McCreanor 2001).

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As a strong woman and charismatic leader, she did not affect the visions, the pretended stigmata, or the like of so many sainthood seekers. She worked tirelessly, traveling on horseback, by horse and cart, and by train to establish schools and foundations far and wide (McCreanor 2001, 119). When she suffered a stroke in 1902, which paralyzed her right side, she adapted to a wheelchair and learned to write left-handed. At her death on August 8, 1909, Cardinal Moran, the Archbishop of Sydney, said, "I consider this day to have assisted at the deathbed of a Saint" ("Mary MacKillop" 2015).

Almost immediately there grew a movement to have her canonized. In North Sydney, a Mary MacKillop Memorial Chapel was built, and her body was reinterred there. In 1926, she received the official title Servant of God, and a detailed investigation of her life began. This produced little that was negative (except for rumors that she overused brandy, which was said to have been prescribed for medicinal purposes). By 1951, a Cause for Canonization was issued. Other developments followed, and when Pope John Paul II visited Australia in 1986, he prayed at her tomb, a sign of things to come. He beatified MacKillop in 1995, and she was canonized by Pope Benedict XVI in 2010 (McCreanor 2001, 124–129; Steer 2010, 64).

Beatification and canonization had each required evidence that MacKillop helped bring about a miracle and, following her death, claims began to appear. In time, the reported 1961 disappearance of leukemia from a woman—Veronica Hopson, twenty-three, who had prayed to the future saint—was used for beatification in 1993. A medical professor who treated Mrs. Hopson, however, stated that while "From her point of view this was a

miracle," he did not himself define it as a supernatural event, saying: "A miracle is a very unusual event, a happy event, that is very difficult to explain. She's certainly the only [such] patient in that period that I have seen survive" (Biggs 2010).

The search for a second miracle turned up numerous claims. One came from a man who prayed that his granddaughter not be born with serious disabilities as doctors had predicted; he felt his prayers were answered when the baby's handicap was only Down Syndrome. A boy was said to have recovered from a brain tumor after prayers at MacKillop's chapel, but medical science seemed to have earned most of the credit.

And then there was the supposedly miraculous "vision" of the Virgin Mary on a church wall at Yankalilla, a small town in South Australia. Alas, the church was Anglican, the image only a simulacrum (a semblance of something perceived in a random pattern—in this case a water stain), and the priest had the unfortunate name Nutter. (He later changed it to Notere, but not before selling holy water he obtained by tapping an underground stream behind the wall that bore the "apparition" [McCreanor 2001, 253–254].)

At length a New South Wales woman, Kathleen Evans, was rewarded with acceptance of her "miracle"—her 1993 recovery from lung cancer and a secondary cancer on her brain. As she recalled some seventeen years later, her doctors said chemotherapy and other treatments were useless, so she turned to praying and wearing a relic of Mary MacKillop: a swatch of fabric from clothing of the future saint. (That is what is termed "a second-class relic": not an actual part of a saint, such as a piece of bone or lock of hair, but something that had touched the person.) She wore the relic on her own clothing ("Second Miracle" 2015).

The problem is that being judged miraculous on the basis of being "medically inexplicable," such claims merely constitute negative evidence and invoke the logical fallacy called "an argument from ignorance." One cannot draw a conclusion from a lack of knowledge: "We don't know why the symptoms went away; therefore, it was a miracle." In fact, there are numerous other possibilities: misdiagnosis, spontaneous remission (which can occur with some illnesses), prior medical treatment, and others, including the body's own healing power. Often, investigation reveals there is more to the "miracle" than first thought (Nickell 2015).

Behind the claims of saints' miracles are attempts to trump science—both by downplaying its role in cures and by selecting "medically inexplicable" cases. One priest best characterized the healing of Veronica Hopson by remarking, "The whole thing was medically surprising" ("The Miracles" 2015). If the Vatican wanted, understandably, to honor Mary MacKillop as a heroine of the church, they should simply have done so, and not played the superstition card in a miracles game. *The Sydney Morning Herald* observed that "the requirement for miracles . . . has begun to be questioned by many Catholics," and *Northern Territory News* aptly noted, "You don't have to believe in miracles to appreciate the works of Mary MacKillop" (McCreanor 2001, 179). ■

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[A MAGICIAN IN THE LAB JAMES RANDI

James Randi began his career as a stage magician and escape artist but achieved fame as a professional skeptic, disproving the claims of self-described psychics, mind readers, and faith healers. He is a founder of the Committee for Skeptical Inquiry (formerly CSICOP).

It Just Never Stops …

To introduce you to the kind of really silly material that I regularly receive for consideration and can deal with only briefly, I ask you to consider this item: From Paris, France, I received a 102-page book—in French. Its title translates as: *Released from Mathematics, to Finally Know What the Universe Really Is, Concretely, and How It Works*.

For clarification, I've made very minor changes to the two paragraphs from the letter that accompanied the book so that you'll have some idea of what really advanced nut-stuff can do to the human brain. Selected from that letter, written to me in English for my convenience:

> Here is the explanation of what the "memory" of water is, and consequently homeopathy, and finally the complete and definitive explanation of what is really, concretely the universe, which, among other factors, at last goes to make the "paranormal" normal.

That "explanation" continued, with portions shown here exactly as emphasized in the original document. Prepare yourself:

> The universe being only inter-reactions between *frequencies of pulsation (of vibration)* of atoms and of molecules, the "memory" of water (like that of other bodies), and consequently homeopathy, explains itself by the fact that water, the molecule of water (as that of other bodies) has this property to "espouse" the *frequency of pulsation (of vibration)* of other molecules put into contact with it, molecules which then can thus leave it while having left in it their *frequency of pulsation (of vibration)*—beneficial *frequency* in the case of homeopathy. It is all and *it is all that makes the universe, the inter-reactions between the frequencies of pulsation (of vibration) of the atoms and the molecules, continuously in pulsation (vibrations)*.

And it went on and on in the same vein. Mercifully, I'll allow the author to remain anonymous.

In 2012, I received by mail an "evaluation/promotion" copy of a 217-page book, *Crystal Clear*—subtitled, "The end of the world is not nigh. It is now!" No index of the contents, of course. . . . It deals with a hoax involving "Skully," a beautiful life-sized human skull said to have been fashioned out of a solid piece of quartz. Advance Bummer: Skully was made of clear acrylic plastic.

This object, we're told, had been presented to "3,912 professional psychics" over a period of six years and was given 1,735 "channeling" sessions by these "experts," who were asked to determine the age, the source, and the general history of the object. Apparently, not one of these authorities experienced an epiphany that would've told them it was a fake only a few years old. Instead, we're told, they all produced colorful stories—using their own preferred brands of supernaturalism—in attempting to divine the less-than-divine truth about Skully. This means—if all holidays are suspended, no weekends off—Skully was examined about twice a day, every day, for 2,192 days, which is six years! I find this difficult to believe, but—as always—I'll try.

Richard T. Cole, the author of the book—who I cannot find among the plethora of Richard T. Coles on the Internet—notifies the reader that he's disguised the names of all participants mentioned in the publication, often at the demands of lawyers. While the contents of the book provide some entertainment, they also evoke a certain sadness about the fact that grown people will involve themselves in such useless activity. There were many obvious clues that required no paranormal powers to provide suspicion about the qualifications of Skully as an ancient artifact. For example, no one seems to have tried scratching the artifact, which would have revealed that it's made of relatively soft acrylic plastic that was easily scratched—while quartz is very,

very, hard. Also, it weighed just 44 percent as much as a similar quartz object would; think of the weight of a solid stone skull, and I'm sure that you would probably have been sufficiently alerted.

The literary skills of Mr. Cole seem to be compromised by basic misunderstandings of how the real world works. He wrote, "The flapping of a butterfly's wings in Scotland can trigger a hurricane in Sicily." This naive concept of a poetic idea, enhanced by his incomplete grasp of optics, basic physics, and science, may have rather limited Cole's analysis of Skully. Nevertheless, the book is still fascinating due to the examples of human frailty it relates.

We're now bombarded by quack claims from every direction, even in advertisements for well-recognized quality items that have chosen to join the noisy ducks. The Philip Stein line of high-quality wristwatches got my attention when I saw their product name subtitled, "Natural Frequencies Inside." What "unnatural frequencies" might be, I could not imagine. Reading on, I found:

> Relax. Wear a Philip Stein. Our Natural Frequency Technology has key frequencies to life and health. Customers report benefits of better sleep, less stress, increased focus and improved overall well-being—we simply call it the Feel Good Watch.

This blurb was accompanied by an illustration with a mirror-image of the back of the watch that revealed two gold buttons labeled "Natural Frequency Technology," both of which are *countersunk into the watch-casing* and therefore cannot make contact with the wearer's wrist! Though I'm not about to buy one of these wonders of technology to find out, I doubt that there's any wiring inside that transmits those beneficial "vibes" to the owner. Perhaps an interested reader might pursue that inquiry.

A confident, purring, female in a beautifully presented vocal ad explains as much as Phil is ever going to provide for us (my punctuation inserted):

> Philip Stein's "well-being technology" was engineered to help us re-connect with Nature. Our natural frequency technology acts like an antenna which is fine-tuned to pick up those natural frequencies that are most beneficial to human well-being.
>
> Live in tune. Philip Stein.

It goes without saying that a substantial reward should of course be available to the Philip Stein people, but I believe that they might have a certain reluctance to have their vapid claim examined. In any case, the "frequencies" mentioned are not defined as audible, vibrational, electromagnetic, or of some other cosmic origin, but the naïfs who are drawn in by such an ad wouldn't know the difference anyway. They only have money from which they obviously can be parted, and I'm sure that the Stein company doesn't much care.

Consider: the official Philip Stein page states, re their "iconic brand":

> . . . 2002 . . . marked the first time in history that frequency-based technology had been incorporated in a luxury watch brand. . .
>
> The Natural Frequency Technology in Philip Stein watches are [*sic*] key frequencies beneficial to life and health. The frequencies embedded in Philip Stein watches provide information to the biofield that makes the person wearing a Philip Stein watch more resilient and adaptable to stress.
>
> Within a year of the official launch of Philip Stein watches, the company was overwhelmed by testimonials—better sleep, less tension, improved concentration and improved overall wellbeing. But perhaps the most important endorsement came in 2003 when media giant Oprah Winfrey featured the watch on her "Oprah's Favorite Things" show.
>
> Better sleep, less stress, improved performance, overall wellbeing…

Well, if Oprah supports this claim, we can't disbelieve! But moving along to an even greater and startling scientific discovery made by Phil:

> Today, Philip Stein watches are sold in 25 countries around the world. The product line has expanded to include a wide range of styles. And, the company has taken its technology one step further, to include lifestyle accessories, including the Philip Stein Wine Wand. The wand uses a mix of natural frequencies to accelerate the "breathing" process of wine, making it ready to drink in minutes.

I obviously need a Stein Wand. Don't we all? How I've muddled along without one for so long, I can't imagine. I was driven to compare the price of a genuine Harry Potter Wand—with its far greater spectrum of attributes—to the Philip Stein Wine Wand. At $49.95, Harry's product works just as well as Phil's—which goes for $525—and Harry's seems far more versatile.

Now, I'm much less enthused about the sort of science that I encounter in the press and on television, and the Information Age has become a possible enemy rather than a friend, as we once thought it would—and certainly could—be. Any nonsense that powerful people such as Oprah Winfrey choose to promote is featured as fact, quackery is extolled, and pseudoscience is flaunted in news media rather than on pulp magazine racks.

We're now bombarded by quack claims from every direction, even in advertisements for well-recognized quality items that have chosen to join the noisy ducks.

The woo-woo field being so bizarre, it's sometimes difficult to spot the simple pranks. For example, there was a 2001 study published in a year-end issue of the *British Medical Journal* (now titled *BMJ*) that used the records of 3,393 patients who were being treated for blood infections at the Rabin Medical Center, the second-largest such facility in Israel, to study retroactive intercessory prayer (RIP). Yes, you read that correctly: retroactive intercessory prayer. Just try to think what that means, folks. Unfortunately, it's the sort of thing that parapsychologists can easily take in stride. To compound the alleged miraculous power of prayer itself, *those experimental prayers were performed several years after*

the patients had either already left the hospital alive or had died from their bloodstream infections! Nonetheless, three primary outcomes—mortality, length of stay in the hospital, and duration of fever—were all found to have been significantly improved in the intervention group, implying that prayer can even change events in the past. The author concluded that "Remote, retroactive intercessory prayer was associated with a shorter stay in hospital and a shorter duration of fever in patients with a bloodstream infection."

Then, to the profound relief of those real scientists—and to myself—who, I admit with some embarrassment, had not readily detected the joke, the author ended his paper with this huge paragraph, though I must say that he'd assumed more perception by readers than I might have assumed:

> Discussion
>
> By now it should be abundantly clear to most readers that the reported study and its results are entirely fictitious. However, despite this irreverent satire, we believe that it might actually be worthwhile doing a large-scale retroactive prayer study of the kind discussed here, just for the sake of testing what we regard as an extremely improbable reality, i.e., a "God signal" that would manifest itself in the manner exemplified here—for certain combinations of prayer and prayee. Some have suggested that the notion of retroactive prayer is so preposterous that researchers need not waste their time investigating it. Others have pointed to instances in physics in which nonlocal interactions in quantum theory or alleged connections between consciousness and quantum theory make this possibility worth an empirical look. Although these latter connections are entirely speculations, and frowned on by nearly all physicists as being without substance (most would use stronger words), I do not believe one needs to invoke such metaphysics to justify an empirical test. For example, if it were true that a personal God exists who sometimes grants prayers, retroactive prayers are just as easy for Him to grant as proactive ones, and they do not require backwards in time signals from the prayee, since God knew who was going to be prayed for all along…

There was more, but this point is clearly made: there are scientific "papers" published regularly all over the world that are comparable to this one—without any discussion/disclaimer. They're meant to be taken seriously, and they often are. The utter foolishness, the juvenile approach, the presumption of these "papers" makes them tissue-thin and patently transparent (multiple puns intended) to anyone with a trace of critical thinking operating for them. Serious journals continue to publish these useless items; the media grab them up and exploit them; and woo-woo is given another boost so that the quacks and frauds can continue to perpetuate their chosen opulent lifestyles.

In that issue of the *BMJ*, the author eventually—officially—admitted that his paper had been a joke, an understood and expected seasonal feature of this otherwise very sober publication, and in the next year they ran similar discussions on RIP and the possibility of quantum physics being involved.

And I trust that the subtle "RIP" acronym was not lost on my readers.

There's much more available on our website!

Skeptical Inquirer

Here's just a sample of what you'll find:

Pratkanis on Altercasting and CSICon

Susan Gerbic interviews Anthony Pratkanis—a professor of psychology at the University of California Santa Cruz and an expert on social influence—on "altercasting," a type of social influence tactic that con artists use to scam the unwary.

TIES Weekly Update

Bertha Vazquez updates Center for Inquiry supporters on the latest developments in CFI's Teacher Institute for Evolutionary Science (TIES) program, whose goal is to provide middle school science teachers with current information about evolution, common ancestry, and diversity so that they may better cover the topics in their classrooms.

[NOTES ON A STRANGE WORLD

MASSIMO POLIDORO

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

The Return of the Fairies

One winter evening a few years ago, G.F., a banker in Cesena, Italy, was traveling with his wife in the Apennines Mountains. Their destination was the hut that the two owned within the Lama Forest. Since it had snowed and the road was getting icy as they climbed, the banker decided to stop the car to apply tire chains. As he was about to begin, the man realized he was not alone. A few meters away from him in the fresh snow there was something unusual.

Instinctively, the banker took out his cell phone and took a picture with the flash on. In the grainy image, there is a creature with human features on its hands and knees, perhaps busy eating snow, looking at the viewer. There's only one problem: the creature looks smaller than normal and resembles in every way an elf, including its elongated ears.

On August 2, 2001, Mr. Pierluigi Ricci went to the Command Station Bagno di Romagna of Forestry to make a very peculiar complaint. As he was about to drink from a well within the Armina Park, Mr. Ricci said there came upon him "a being high around 25 centimeters that I consider to be a 'gnome' of the woods."

He then gave a fairly detailed description of it: human appearance and clothing consisting of a blue jacket, brown pants, beige fur boots, red and white beard; in other words, a textbook gnome.

Are these perhaps jokes or the ravings of mad men? The State Forestry doesn't seem to think so, since an Italian news agency, Adnkronos, found a green folder of the Ministry of Agriculture and Forestry created about fifteen years ago titled "Gnomes and Fairies of the Woods."

It contains information, reports, and photographic material relating to alleged sightings of mysterious creatures in the woods. All of them concentrated, curiously, in a particular area: the Apennines between Tuscany and Romagna, in particular around the area of several municipalities such as San Piero in Bagno and Bagno di Romagna.

"We receive all kinds of reports," says Stefano Cazora, chief press officer of the State Forestry Corps. "In this case, the gnome is seen as a guardian of nature, just like our Corp is recognized as the environmental protector."

Origins of the Fairies

Sightings of fairies and gnomes are far from a contemporary discovery. The origin of fairies can be traced back to the figure of the *Parcae* of classical mythology, otherwise known in Latin as *Fatum*, and it was in the Middle Ages that their appearance became that of young girls with pointy hats; the addition of wings came only in the Victorian era.

It was slightly later that the first and most famous "sighting" photo in history came, made famous in the 1920s by Sir Arthur Conan Doyle, the creator of Sherlock Holmes. Doyle came into possession of photographs taken at the

English village of Cottingley by two girls and was amazed when he saw that they portrayed some fairies in flight and even a gnome handing a flower to one of the girls. He dedicated articles and a book, *The Return of the Fairies*, to the episode.

In more recent times, fairies have appeared in photographs and even home videos, always very grainy and shot in poor lighting conditions. In 2008 in Argentina, for example, a video surfaced that kids shot one night where a gnome, with his typical pointy hat, can be seen jumping to the side. The film was taken seriously, especially by some British newspapers, but it turned out to be a hoax.

The Fruit-Like Creatures

If fairies and gnomes really existed, however, we should occasionally find their remains because, as living creatures, it is assumed that sooner or later they too must die. In reality, strolling in the woods or during a picnic, one can find carcasses of other, far more familiar, woodland creatures, such as squirrels, rabbits, or sparrows—yet never the dead body of a fairy or an elf. Yet, according to some, the bodies of some fairies were actually found. In a Buddhist temple on the outskirts of Bangkok, Thailand, there is a glass case in which are stored the tiny bodies of what seem to be two little deformed fetuses. There they are known as "Naree Pon," which, according to local legends, are hybrids of plants and animals. They are born like fruit from a tree and then transform into beautiful female creatures that live only a few days. Aside from these two specimens, however, it does not appear that any have ever been found.

April Fool's Tricks

In March 2007, a man taking his dog for a walk in Derbyshire, England, stumbled upon the tiny body of a mummified humanoid creature, about twenty centimeters long and with a pair of wings. The uproar caused by the news died down only when it was learned that it was an April Fool's joke. The dehydrated fairy was in fact the work of a creator of tricks and illusions for magicians, Dan Baines, who had published the photos on his website, receiving more than 20,000 visits in one day. Baines revealed the joke on April 1 of that year.

The Cottingley fairy photographs taken by the girls also began as a joke that got out of hand. They had drawn and carved in some cardboard the silhouettes of fairies and a gnome, photographing them using their father's camera. It was intended to be just an innocent joke for the family, but the photos ended up in the hands of Doyle, who took them for genuine. Embarrassed, the girls kept the secret for fifty years and only when everyone involved had already died did they decide to reveal the hoax.

Figments of Imagination

When the fairy report or image is not based on deception—however innocent and playful—how can we explain the sightings? Sometimes, especially in the dark or in a forest, we can catch the sight of some animal or form, and the power of suggestion turns it into a creature of the imagination. At other times, it's the photos themselves that unleash the imagination: the more the picture is grainy and blurred, the more easily our brains find a meaning. It is the classical mechanism known as *pareidolia*, the cause of many UFOs, ghosts, Marian, and fairies sightings.

As for the Ranger files, the provincial command of Forlì-Cesena made it clear that there are no recent sightings and that it is not exactly an open case file, since there are no elements for an official crime or offense. It's just an outdated dossier collecting stories that, at the time, encouraged local newspapers' attention but ended up forgotten after a while.

However, these stories had at least one result: stimulating a brand new form of tourism. In Bagno di Romagna, a "path of the gnomes" theme walk has become popular, and another hiking area where nature hikes mix with fairy tales has been named after Mentino, a popular gnome. Fairies and gnomes are only figments of the imagination, but if they can encourage people to rediscover and preserve the authentic wonders of nature, they are welcome. And then—who knows—maybe one day we could even find some unknown "little people" actually hiding in our gardens.

The Rossdale Fairies

That was exactly what seemed to happen when, in 2014, newspapers reported that a professor in Manchester, John Hyatt, had photographed a group of small creatures, oddly looking like fairies, in flight. The picture indeed showed small winged creatures whose bodies resemble that of tiny human beings.

His images were "genuine and have not been altered in any way," he told the newspapers. "The message to people is to approach them with an open mind. There are stranger things in life than fairies, and life grows everywhere" (Slater 2014).

However, after examining the photographs, Erica McAlister, an expert on insects at the Natural History Museum in London, recognized them. "My first impression was they can't be fairies as there is no wand. But that is like saying mosquitoes aren't flies because they don't look like your typical house fly, so I had to approach this more taxonomically" (Freeborn 2014).

She finally identified the insects as "small swarming midges such as chironomids" that resemble mosquitoes but have longer limbs. They possess a more slender body and long slender legs that, in flight, hang down, in fact, resembling the limbs of a human being. "There are many undescribed species on the planet," says McAlister, "and who knows what lies out there—we are still determining new species all the time, including large mammals. But as far as I know, no magical beings have turned up yet. Personally, I'm holding out for a unicorn."

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WELCOME
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The Mindfulness Movement

How a Buddhist Practice Evolved into a Scientific Approach to Life

A few years ago, I took up the regular practice of meditation. Sitting in a quiet room, outside at a park, or on the train to work, I would assume an upright relaxed position and focus on my breath. The practice was not about making my mind empty or blank but simply letting my mind be at rest.

As thoughts or feelings inevitably arose, I would observe them without judging them. For example, if a thought about the need to finish a column for this magazine popped into my head, I would silently label the thought "worry," before returning to focus on my breath. I learned, as psychologists describe, that the contents of my conscientiousness could be observed, and that the accompanying emotional reactions to them were seldom grounded in reality (Brown et al. 2007).

After several months of daily meditation, I noticed significant benefits. Meditation seemed to slow time down, enabling me to live and work in the present rather than worry about the future. I was quicker and more adept at recognizing how unrealistic expectations or unfounded worries were causing unnecessary stress. My sleep and mood improved. I felt happier, more content, and more at ease.

Inspired by my own experience, I began to read widely on the history, philosophy, and science of mindfulness. The story of the movement's origins, the process by which it has gained scientific legitimacy, and its rise to popularity among well-educated, affluent Americans is fascinating and revealing.

Gaining Popularity and Legitimacy

With its roots in Buddhism, meditation is used widely by health professionals to treat depression, anxiety, post-traumatic stress disorder, pain, insomnia, eating disorders, relationship problems, and other conditions. Professional athletes use meditation to improve their performance, as do CEOs and Silicon Valley programmers. Meditation is similarly taught in schools and colleges as a way to help students (and teachers) better regulate their emotions, to improve concentration, and to manage stress and anxiety (Harrington and Dunne 2015).

The concept of "mindfulness" traces to the Pali words *sati*, which in the Indian Buddhist tradition implies awareness, attention, or alertness, and *vipassana,* which means insight cultivated by meditation. But as the University of British Columbia's Jeff Wilson (2014) detailed in his book-length study of America's mindfulness movement, similar breath-attention techniques are

found in Tibetan Buddhism and in the Japanese Zen meditation practice of *zazen*. All three strands of Buddhism influence approaches to mindfulness today.

Historically, in Asian Buddhist cultures, monks and nuns practiced meditation, not the broader population. For the ordained seeking the path to enlightenment, meditation was an instrument to facilitate asceticism, detachment, and renunciation, wrote Wilson (2014). During the mid-nineteenth century, as trade with Asia increased, Westerners began to take an interest in Buddhist teaching by way of pamphlets, books, and journals. Yet despite this interest, meditation did not emerge as a focus in the United States and Europe until the 1960s.

During this decade, reforms in immigration policy enabled hundreds of thousands of Asians to emigrate to the United States, including several prominent Tibetan and Zen missionaries who founded Buddhist centers and toured college campuses. Courses on Buddhism at the university level soon followed, offerings that were popular among students seeking counterculture alternatives to Western paradigms. Some of these students traveled to South Asia to study Buddhism or discovered meditation as part of the Peace Corp. By the 1970s, three main sources of meditation-focused teaching appeared "that would become the most important wellsprings of the American mindfulness movement," wrote Wilson (2014, 31).

In 1976, Joseph Goldstein, Jack Kornfield, and Sharon Salzburg founded the Insight Meditation Center in Barre, Massachusetts. Having studied Buddhism in South Asia, their goal was to create a retreat center that could emulate in an American context what they had experienced. In their teachings, articles, and books, Kornfield, Goldstein, and Salzburg deliberately downplayed elements of chanting, ceremony, and cosmology, noted Wilson (2014). Instead, they focused on meditation and mindfulness, integrating elements of Western psychology and psychotherapy.

The second main force in the rise of mindfulness was the Buddhist monk Thich Nhat Hanh. Exiled from Vietnam, he gained prominence as a speaker and activist against the war during the 1960s. By the mid-1970s, he shifted to focus on the promotion of mindfulness and meditation, publishing the *Miracle of Mindfulness* and more than 100 subsequent books. Today, some 350 official meditation practice groups are affiliated with Hanh's teachings. Along with the Dalai Lama, he is the world's best known Buddhist, noted Wilson (2014), having appeared on Oprah Winfrey's talk show numerous times and annually touring the United States.

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Yet the most influential figure in the acceptance of mindfulness as a secular and scientific practice has been Jon Kabat-Zinn. As a student at MIT, Kabat-Zinn was introduced to meditation by a Zen missionary. He went on to study at the Providence Zen Center, at the Insight Meditation Center, and with Thich Nhat Hanh, drawing on these and other traditions to inform his own approach to teaching mindfulness. After earning a doctorate in molecular biology, Kabat-Zinn in 1979 started a stress reduction center at the University of Massachusetts Medical School, developing an eight-week Mindfulness-Based Stress Reduction (MBSR) course.

Kabat-Zinn's key innovation, noted Wilson (2014) was to take the traditional week-long meditation retreat, inaccessible to those with busy lives, and to offer participants classes that took place once a week for two months. Participants, who usually numbered between thirty-five and forty per course, were assigned guided meditation recordings to use at home for forty-five minutes each day for the duration of the course. They were also instructed on how to be mindful of their breath during their daily activities, expanding the "thread of meditative awareness" into every aspect of their lives (Kabat-Zinn 2013).

Just as important, the course was able to be offered across clinical and institutional settings. Instructors, many with advanced degrees in the mental health professions, were required to complete an intensive certification process and to keep their training up to date. With the practice of meditation transformed into a clinical intervention, the effects on a range of mental, physical, and behavioral outcomes could be evaluated and published in the peer-reviewed literature.

According to historians Ann Harrington and John Dunne (2015), Kabat-Zinn recognized that in a secular society, the health sector was where he could have the greatest impact as a Buddhist teacher. "Hospitals and medical centers in this society are *Dukkha* magnets," he told a Buddhist magazine in 1991, using the Pali word for suffering. "People are drawn to hospitals primarily when they're suffering, so it's very natural to introduce programs to help them deal with the enormity of their suffering in a systematic way—as a complement to medical efforts" (Graham 1991).

Yet to gain legitimacy within the medical community, Kabat-Zinn understood that he needed to strip his approach of any overt religious connections, framing mindfulness as a mental skill acquired through meditation that involves "paying attention in a particular way; on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn 2005). By promoting mindfulness, meditation could help patients manage the suffering associated with illness, reasoned Kabat-Zinn, by enabling them to be more accepting of their experience, which in turn would lessen pain, anxiety, and depression. Most would still need traditional medical treatment, but meditation could help speed the recovery process and prepare them to successfully navigate future experiences and decisions (Harrington

and Dunne 2015).

Kabat-Zinn had transformed meditation from a practice rooted in Buddhism to that of a scientifically based form of health promotion. Meditation was now the "property of psychologists, doctors, scientists, and diet counselors and to be engaged in by clients rather than believers, who are not expected to take refuge, read scriptures, believe in karma or rebirth, or to become Buddhist," wrote Wilson (2014).

Today, more than 600 studies are published annually on meditation and mindfulness. Observational studies evaluate the efficacy of meditation on health-related outcomes and school performance. Other studies investigate how meditation might influence parts of the brain linked to positive emotions… Yet as widespread as meditation has become. . . many of the scientific findings have not yet been sufficiently replicated.

Technology, the Market, and Mindfulness

Popular interest in meditation and mindfulness blossomed during the 1990s. At Barnes & Noble and Borders, Americans could purchase previously difficult to find magazines such as *Tricycle: The Buddhist Review* and the *Shambala Sun* along with books by Goldstein, Kornfield, Salzburg, Hanh, Kabat-Zinn, and many other authors. The Chinese occupation of Tibet, noted Wilson (2014) brought worldwide media attention to the Dalai Lama along with acclaimed Hollywood movies about Tibet such as *Seven Years in Tibet*, *Little Buddha*, and *Kundun*. The 1993 Bill Moyers PBS special *Healing and the Mind* featured Kabat-Zinn and his MBSR approach, turning his books into best sellers. For sports fans and athletes, Phil Jackson, coach of the champion Chicago Bulls, related in interviews how he had encouraged Michael Jordan and other players to practice meditation.

During the 2000s, with books, talks, and documentaries about mindfulness instantly available via Amazon, Netflix, and YouTube and guided meditations downloadable to smart phones, public interest in mindfulness was set to explode. By 2012, an estimated two million American adults reported having practiced some form of meditation within the past twelve months (Monroe et al. 2017).

Today, more than 600 studies are published annually on meditation and mindfulness. Observational studies evaluate the efficacy of meditation on health-related outcomes and school performance. Other studies investigate how meditation might influence parts of the brain linked to positive emotions, cause some parts of the brain to grow, and be related to changes in brain wave activity among experienced practitioners (Ricard et al. 2014).

Yet as widespread as meditation has become in clinical settings, schools, and the business sector, many of the scientific findings have not yet been sufficiently replicated. Most researchers in the field are enthusiastic meditators themselves, enabling them to apply important insights but also potentially biasing their conclusions. Like in psychology more generally, there is a strong bias toward publication of positive or significant results. The methodological rigor of many studies also remains low with few longitudinal control studies conducted (Tang et al. 2015).

As scientists and researchers continue to resolve uncertainties about the effects of meditation on the brain and health, outside the community of practicing Buddhists, the mindfulness movement remains multidimensional and varied, noted historians Harrington and Dunne (2015). Many health professionals view mindfulness as a powerful medical intervention best taught by trained and credentialed clinicians. Still, many other Americans have come to see it as a form of mental fitness training, applicable in varied ways to boost performance in school, business, or athletics or advance their careers. Other Americans have come to embrace meditation as a practice similar to yoga that is related to overall health or emotional resilience. A few notable others, including Kabat-Zinn, have even started to promote mindfulness as an antidote to our polarized, fractured politics, providing a common basis for recognizing shared values and goals. From this perspective, a sense of interconnectedness begins with mastering the art of conscious living. ■

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Your Unlearning Report

Empathy Is Bad, You're Not as Racist as You Thought, and Believing in Luck Won't Help Your Golf Game

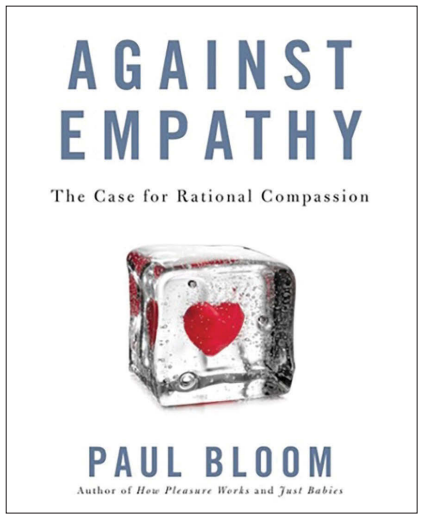
For a skeptic, there is nothing more satisfying than discovering that some previously cherished truth has been overturned by new evidence. It is in that spirit that I offer the following Unlearning Report.

Empathy Is Bad

Everybody loves empathy. Former President Barack Obama often spoke about our "empathy deficit" and the need to "see the world through the eyes of those who are different from us" (Obama 2006). Amazon.com lists over 1,500 books with "empathy" in their titles or subtitles, and the Internet is replete with blogs and YouTube videos on the subject. Yes, everybody loves empathy—everybody except Yale University psychologist Paul Bloom.

It seems wrong to be against something so kind and well meaning as empathy, but in his new book, *Against Empathy: The Case for Rational Compassion*, Bloom builds a strong argument for empathy as a destructive emotion. He suggests that empathy is innumerate and myopic and that more good can be done by adopting "rational compassion," a more detached form of caring.

For example, Bloom cites the research of C. Daniel Batson and colleagues (1995) who told study participants about a ten-year-old girl who had a fatal disease and was waiting in line for a treatment that would relieve her pain. The participants were told that they could move her ahead in the



line, and when simply asked what to do, most said that the girl must wait because there were others ahead of her in line. However, when they were asked to imagine what she felt, they were more likely to choose to move her up the line. In this case, empathy made participants bend the rules unfairly.

Bloom spends considerable time discussing the innumeracy of empathy. This passage sums up the problem: "Stalin has been quoted as saying, 'One death is a tragedy; one million is a statistic.' And Mother Teresa once said, 'If I look at the mass, I will never act. If I look at the one, I will.' To the extent that we can recognize that the numbers are significant when it comes to moral decisions, it's because of reason, not sentiments" (Bloom 2016, 89).

In one study (Kogut and Ritov 2005), participants in two separate groups were asked to give money for a drug that would save one child or a drug that would save eight children. They tended to give equal amounts, but when a name and a picture where associated with the child, donations were larger for the one child than the eight. Similarly, psychologist Paul Slovic (2007) points to the case of eighteen-year-old U.S. high school student Natalee Holloway, who went missing while on vacation in Aruba. Coverage of this case dominated the cable news for weeks despite an ongoing genocide in Darfur.

In addition, caregivers who are empathetic may also be less effective than those who are more detached. As a recent article in *Aeon* (Jongsma 2016) suggested, doctors who attempt to feel their patients' pain will be ill suited to concentrate on their work. Similarly, when seeking the help of therapists, we don't really *want* them to experience what we are experiencing—instead we are looking for a compassionate listener who can provide suggestions and support. Finally, there is evidence that in contrast with a more reserved sense of compassion, sustained empathy can lead to burnout and negative emotions (Bloom 2016, 137–139).

As an alternative to empathy, Bloom advocates rational compassion, an approach consistent with the utilitarianism of philosopher Peter Singer. For Bloom, being a good person involves caring for others combined with an

appreciation of how best to distribute that care. This is a view embodied by a growing Effective Altruism movement (see www.effectivealtruism.org), which Singer also supports. Effective altruists donate money and time to others, but they do so after calculating where they can do the most good. When it comes to financial contributions, this approach often leads people to direct their funds to Africa and other parts of the developing world, where economic differences allow their dollars to go further. Effective altruists also consult rigorous evaluators of charities, such as GiveWell.org. It's less about making the giver feel good and more about doing the most good you can.

You're Not as Racist as You Thought

Since the 1990s, social psychologists have been studying unconscious biases—particularly those surrounding race, gender, and other socially relevant variables—using the Implicit Association Test (IAT). The test uses reaction times as an indirect measure of cognitive processes. In a typical arrangement, participants are asked to sort images or words by pressing either the "E" key of a keyboard with their left hand or the "I" key with their right hand. At first the task is simple. You might be asked to sort words that are either negative sounding ("bad") or positive ("good"). In a similarly easy task, you might be asked to sort pictures of African American or European American men. The words in the upper left-hand and upper right-hand corners of the panels in Figure 1 indicate the left and right choices that participants are to use in sorting.

The IAT gets more difficult when trials combine two kinds of stimuli—pictures and words—to be sorted. As shown in panels 3 and 4 of Figure 1, participants are told that either a word or a face might appear in the center of the screen, and they should sort the stimulus accordingly. These combined sorting trials provide the crucial test for the presence of bias.

The Implicit Associations Test is often used in industry, education, and nonprofit organizations to spur an appreciation for the kinds of biases most of us harbor.

Typically, when the left and right responses combine categories that are inconsistent with the participant's biases, responses slow down. For example, if the participant has an unconscious bias against African Americans, it will take longer to decide the word "Happy" requires a right-hand response when it is arranged as shown in Figure 1, panel 4. The most common theory behind this effect is that certain mental operations are automatic and others require deliberation. When the categories are inconsistent with our implicit biases, slower deliberative processing is required to sort the stimuli.

Figure 1. Panels patterned after four possible trials of an Implicit Associations Task. In panel 1, participants press a left-hand key if the word is positive and a right-hand key if it is negative. In panel 2, participants press left if it is a picture of an African American and right if it is a European American. In panels 3 and 4, either a word or a picture might appear, and the correct left or right response is indicated by the words in the upper left-hand and upper right-hand corners. (This figure was created by the author and only approximates the versions used in research.)

By now, implicit bias is a well-established concept, so much so that Carl Bialik (2017) of the *FiveThirtyEight.com* blog cited unconscious bias against women as a possible explanation for the results of the 2016 U.S. presidential election. Over two million people have taken the IAT by visiting the Harvard University Project Implicit website (Holden 2014), and in 2013, Mahzarin Banaji and Anthony Greenwald (2013), the researchers most closely associated with the IAT, published a bestselling book called *Blind Spot: Hidden Biases of Good People*. The IAT is often used in industry, education, and nonprofit organizations to spur an appreciation for the kinds of biases most of us harbor.

But how important is implicit bias? A recent article in the *Chronicle of Higher Education* (Bartlett 2017) outlines a growing number of questions that dog the IAT. Two decades after the test was first introduced, hundreds of research studies have used it, and several meta-analyses have been conducted summarizing the combined results of many investigations. Most notably Patrick Forscher (2016) of the University of Wisconsin and colleagues recently conducted a meta-analysis looking at 426 studies incorporating a total of 72,063 research participants. Furthermore, the Forscher study employed a number of improvements over previous meta-analyses.

Earlier investigations had already raised questions about whether the IAT is reliable enough to produce consistent scores when users are retested, and even Banaji and Greenwald admitted that the correlation between implicit bias and actual prejudicial behavior was weak (Bartlett 2017). Unfortunately, the Forscher study found even weaker associations between unconscious bias and prejudicial behavior. Furthermore, implicit bias researchers have long assumed that interventions aimed at reducing these unconscious biases would result in changes

in actual behavior, but the authors of the new meta-analysis concluded, "Our findings stand in stark contrast to these predictions" (Forscher et al. 2016). Forscher and colleagues suggest there is still value in studying implicit bias as an indicator of the culture's effects on us, but they also state that any "efforts to change behavior by directly changing implicit bias would be misguided" (Forscher et al. 2016).

The Forscher study is still under review at the prestigious journal *Psychological Bulletin* and has not yet been accepted for publication. Nonetheless, there are two reasons to believe the results are worthy of attention. First, in an approach advocated by the Center for Open Science (COS, www.cos.io), the authors used a publicly stated methodology and posted the raw data of their study so that others could examine and reanalyze it if they wish. As I mentioned in my December 2016 online Skeptical Inquirer column (Vyse 2016), COS is a direct response to recent revelations about the unreliability of research in social psychology, medicine, and other areas. The hope is that opening up research and inviting peer comment throughout the entire process will result in more trustworthy outcomes. The recommendations of COS are quickly gaining acceptance among many scientific journals and professional associations.

Finally, one of the coauthors of the Forscher meta-analysis is Brian Nosek, who is both a cofounder of COS and, along with Banaji and Greenwald, the person most closely associated with early use of the IAT.

Believing in Luck Will Not Help Your Golf Game

This particular unlearning lesson hits close to home for me. In 2010, a group of researchers at the University of Cologne conducted the first study to show that believing in luck could improve performance of a skilled activity (Damisch et al. 2010). Research participants were invited to putt a golf ball into a cup on the carpet of a laboratory. As they were handed a golf ball, half the participants were told, "So far it has turned out to be a lucky ball," and the other half were simply told "This is the ball everyone has used so far." Remarkably, in this and different versions of the study, participants who had the "lucky ball" actually sunk significantly more putts on average than those who did not get a lucky instruction.

I found these results quite interesting, and given that the German researchers had published their work in a prestigious journal and had conducted several related experiments, all of which showed the luck effect, I incorporated the study into the 2013 revision of my book on superstition (Vyse 2013) and began to mention it in public comments about belief in superstition. It seemed plausible that, in the case of a skilled activity such as golf, there could be a psychological benefit to believing in luck. There was no reason to credit anything supernatural in the findings, but just as placebos can produce real health benefits, it has long been speculated that superstitions might have a psychological effect that could translate into better performance on skilled activities. Unfortunately, in this case, I was too quick to jump at an exciting new finding.

In 2014, two researchers from Dominican University in Illinois published a replication of the German golf ball study in *Social Psychology* (Calin-Jageman and Caldwell 2014). This was a registered replication, which means that, similar to the Forscher meta-analysis, the researchers publicly stated exactly what they intended to do before they started collecting data and, in addition, they made the raw data publicly available once the experiment was complete so that anyone who wished to could independently reanalyze the results. Finally, the sample of participants for the Dominican study was roughly three times that of the German study, making it a much more powerful test.

As by now you may have guessed, the results of the replication were negative. Telling people "this ball has been lucky today" did not improve their ability to putt into a cup. It is true that the original study used German participants and the replication used U.S. participants, but the Dominion researchers measured the level of superstition in their people and found it was comparable to that of the German participants. Of course, some kind of cultural difference could be at play, but superstition and luck are popular concepts in both countries. So it looks as though the famous golf ball study has become just another victim of the reproducibility crisis. We will have to wait for further research to determine if there is any psychological benefit to believing in superstitions.

Final Thoughts

1. I highly recommend Paul Bloom's book *Against Empathy: The Case for Rational Compassion*. It is well reasoned, clear, and entertaining.
2. If you have not already done so, you might enjoy visiting the Implicit Project website (www.implicit.harvard.edu/implicit/takeatest.html) and taking one of the several implicit bias tests offered there. They are free, and although—as we now know—unconscious bias does not necessarily translate into biased actions, you might find the test interesting and thought-provoking. Do you think it really measures what it purports to measure?
3. It appears the best advice about luck and golf comes from a quote so good that it has been attributed variously to Ben Hogan, Gary Player, or Arnold Palmer: "The more I practice, the luckier I get." ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of ten books, including *Bad Clowns*.

Can Electromagnetic Fields Create Ghosts?

Q: I recently read your book *Scientific Paranormal Investigation: How to Solve Unexplained Mysteries* about the mistakes that ghost hunters make using EMF detectors during investigations and how they are not productive. However, I always understood that EMF meters/readers were used to measure EMF levels because high levels of EMF could cause hallucinations that result in paranormal-like experiences. Any thoughts on this?

—M. Chapman

A: Many ghost hunters, including the T.A.P.S. team on the television show *Ghost Hunters*, use EMF detectors to search for electromagnetic fields because they believe that intense magnetic fields can create hallucinations, which in turn might create the illusion of ghosts. The basis for this theory comes primarily from research done by a Canadian cognitive neuroscientist, Michael Persinger. He found that hallucinations (such as out-of-body experiences) could be triggered by stimulating specific areas of the brain with fixed wavelength patterns of high-level electromagnetic fields.

He suggested that EMFs might therefore be responsible for everything from UFO sightings to religious apparitions to ghosts. As researcher Chris French notes:

> The proposal is that fluctuations in the earth's background magnetic field can interact with the temporal lobe, especially in individuals with a particularly sensitive temporal lobe, to produce a sense of a presence and visual hallucinations. . . . This explanation offers the intriguing possibility that such transcerebral magnetic stimulation may lie behind many reports of ghosts and hauntings. (French and Stone 2014, 99)

It's an interesting theory. Unfortunately for the ghost hunters, it's just a theory—not a proven effect. In fact, there's little or no evidence to support the idea that EMFs create ghosts. Ghosts are not being seen in Persinger's experimental laboratory in Ontario; they are being seen in abandoned hospitals and suburban basements. There is simply no evidence that common household appliances can generate EMFs of the

The author uses an EMF detector to demonstrate for a television crew how electrical outlets can create false "ghost" readings at the historic KiMo theater in Albuquerque, New Mexico. Photo by Larry Barker.

frequency and power that induce hallucinations in a clinical setting.

Indeed, Yale neuroscientist Steven Novella says that the theory of EMFs as an origin for ghosts is "speculative at this point." The electromagnetic stimulation used by Persinger

> has to be focused, and at a certain frequency in order to have this effect. It seems unlikely that environmental electromagnetic fields would be fine-tuned just enough to cause this effect. . . . It's an interesting idea; I just don't think it's terribly plausible. At present, while we can certainly duplicate it in a lab, I'm not aware of any evidence to suggest it actually happens out there in the world. (Novella 2010)

Richard Wiseman, in his book *Paranormality: Why We See What Isn't There*, notes that several researchers tried to replicate Persinger's results. A team of Swedish psychologists led by Pehr Granqvist

> became worried that some of Persinger's participants may have known what was expected of them and their experiences could therefore have been due to suggestion rather than the subtle magnetic fields. To rule out this possibility in his work, Granqvist had all of his participants wear Persinger's borrowed helmet, but ensured that the [magnetic] coils were only turned on for half the participants. Neither the participants nor the experimenters knew when the magnetic fields were on and when they were off. The results were remarkable. Granqvist discovered that the magnetic fields had absolutely no effect. . . . Worse was to come for Persinger. In 2009, psychologist Chris French and his colleagues from Goldsmiths College in London carried out their own investigation into Persinger's ideas by hiding coils behind the walls of a featureless white room, and then asking people to wander around the room and report any strange sensations. Seventy-nine people visited this most scientific of haunted houses for about 50 minutes each. Following in the footsteps of Granqvist, French and his team ensured that the coils were only switched on for half of the visits, and that neither the participants nor experimenters knew whether the coils were on or off. The magnetic fields had absolutely no effect on whether or not people reported a strange experience. (Wiseman 2011, 219–220)

In their rush to accept this "scientific" explanation for ghost sightings, investigators extrapolate far beyond the evidence. Until it can be demonstrated that generalized, nonclinical EMFs can create the psychological perception of ghostly phenomena, there is no investigative value in detecting such fields. If ghost investigators are certain that common household EMFs can create ghost hallucinations, there are simple ways to test that theory. If Persinger is correct and EMFs are in fact related to ghostly experience, it's because the EMFs are *causing the illusion of ghosts*. If ghosts exist, they may or may not be related to EMFs (there's no evidence showing they are), but ghost hunters who cite Persinger's research in support of their methods are unwittingly undermining their own arguments: If you are sure that ghosts are real (and not the product of EMF-induced hallucinations), there is no logic or point in using a device to detect those EMFs. ■

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Science and History Get Personal

MICHAEL BOOTH

One of the oldest scientific societies in existence, The Royal Society, has been awarding distinguished individuals with the Copley Medal since 1731, one hundred and seventy years before the first Nobel Prize. The list of Copley Medal recipients includes such recognizable names as Benjamin Franklin, Joseph Priestly, Charles Darwin, Thomas Huxley, Albert Einstein, Max Planck, Niels Bohr, Francis Crick, James Watson, Stephen Hawking, and Peter Higgs (The Royal Society 2016).

Dorothy Hodgkin, also a Nobel laureate in Chemistry, received the Copley Medal in 1976. Among her tremendous scientific contributions, Dr. Hodgkin pioneered the use of X-ray crystallography with complex biological molecules, spawning the field of protein crystallography (Ferry 2014). In her lifetime, she deciphered the atomic structure of insulin, vitamin B12, and penicillin.

Dr. Hodgkin also suffered from an autoimmune disease, rheumatoid arthritis. Diagnosed in her early twenties, Hodgkin spent most of her scientific career with episodic pain and inflammation and eventually an agonizing onset of deformities. The disease would be crippling, though she would continue to travel the globe promoting science and international human rights until her death in 1994.

Coincidentally, X-ray crystallography would eventually be used to decipher the structure of tumor necrosis factor alpha, a cytokine that plays a role in systemic inflammation (Eck and Sprang 1989). Current biologic drugs such as entanercept and adalimumab (Enbrel and Humira) inhibit the production of tumor necrosis factor and are common treatments for rheumatoid arthritis (often in combination with other disease modifying drugs). Advanced forms of X-ray crystallography, called macromolecular crystallography, are currently used in various pharmaceutical developments (Scalip 2006).

The most immediate sign of a likely pseudoscientific intervention is when the same treatment is claimed to have broad effects for a vast array of conditions.

Science and History Get Personal

Similar to Dr. Hodgkin, I also have rheumatoid arthritis (RA). Living with it is no easy task. Physically it can be excruciating, defeating, and endlessly frustrating, as the most mundane tasks can become massive obstacles. Psychologically it is also brutal. Though difficult to quantify, RA patients suffer from bouts of depression and diagnosable major depressive disorder at a rate greater than the general population (Matcham et al. 2013).

Most surprising to me is how difficult the disease can be to live with socially. In my range of friends, family, and acquaintances, I am unfortunate enough to have a plethora of self-appointed experts on treating my illness (or denying that it exists entirely). Yet most of these individuals don't know the difference between aches and pains due to wear and tear and systemic inflammation.

Here are a few implausible things I have heard while telling others about rheumatoid arthritis:

"Have you tried cherries?"

"All diseases are an illusion of Western medicine."

"Doctors are keeping you sick with those drugs."

"My massage therapist recommends turmeric and crystals for inflamed joints."

"Just imagine the outcome you want, and it will come."

"Have you tried essential oils? My bruises heal way faster and my wife just became a vendor."

And so on . . .

Raise Your Red Flags!

The most immediate sign of a likely pseudoscientific intervention is when the same treatment is claimed to have broad effects for a vast array of conditions that share no common biological pathway or relationship. My immune system is attacking the synovial lining of my joints. If treatment X, for example, *also* cures/helps schizophrenia, depression, back pain, dental pain, nausea, irritable bowls, constipation, headaches, allergies, dysentery, sciatica, sprains, tennis elbow, hay fever, morning sickness, hypertension, hypotension, facial pain, stroke, and rheumatoid arthritis, it must be truly mirac-

ulous (Evidence Based Acupuncture 2016). If it really can do all of these things, what are the mechanisms of action? What is the biological pathway that ties all of these together?

Contrast this with the very modest—and very precise—claim that tumor necrosis factor plays a role in systemic inflammation. When inhibited, it can slow disease progression in a tested percentage of individuals with rheumatoid arthritis, Chrohn's disease, psoriatic arthritis, juvenile arthritis, inflammatory bowel disease, ankylosing spondylitis, and psoriasis because they are all rheumatic inflammatory diseases (American College of Rheumatology 2016). Even without the research on efficacy rates in random clinical trials, juxtaposing the extremely broad and miraculous claim having no known mechanism of action with the modest claim that has an objectively known biological pathway should elucidate the general concept of plausibility for those who push alternative medicine.

So Why Is This Important?

What I see playing out is a professional turf war, where tropes of ethnocentrism, closed-mindedness, and dogmatism are ways of taking knocks at scientific knowledge if it excludes one's deeply held view. The risk of making testable claims is having one's claims tested and found wanting. If publicly funded research is really about potentially benefiting patients like me, then scientific research based on plausibility—not continued testing of alternative interventions that are implausible and perform no better than placebo or sham controls—should be the way forward. Not all ideas are equally valid and deserving of continued inquiry. Special pleading for more research dollars when systematic reviews have shown no efficacy greater than expectation effects in the most stringently designed experiments is not about the potential benefit to those who suffer.

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Massimo Pigliucci
CSICON 2016 LAS VEGAS: A SPECIAL SECTION

SURVIVING THE MISINFORMATION AGE

For ourselves and our society, survival in the current era will require building our foundation on facts.

DAVID J. HELFAND

IN 2016 many in the mainstream media portentously declared we had entered the age of "post-truth politics" (Drezner 2016) and now live in a "post-factual democracy" (Barret 2016). With monetized "fake news" sites proliferating, tweets inconsistent with reality dominating political debate, and most citizens busily constructing echo chambers of their personal beliefs through their social media accounts, the hysteria may seem warranted. But as Alexios Mantzarlis of the Poynter Institute reminds us (Mantzarlis 2016), politicians, media commentators, and your next-door neighbor have been playing fast and loose with the "truth" for a long time.

Indeed, the classical scholar Edward M. Harris noted in his paper dissecting "Demosthenes Speech Against Medias" (Harris 1989) that 2,400 years ago in Athens, "although a witness who perjured himself could be prosecuted…an orator who spoke in court could indulge in as much fabrication as he wished without fear of punishment." Harris went on to state: "In short, nothing aside from the knowledge of the audience and the limits of plausibility restrained the orator from inventing falsehoods and distorting the truth."

Public prevarication, then, is nothing new. What is novel is the technology-saturated environment in which it is now embedded. It is the "knowledge of the audience" and the "limits of plausibility"—not the falsehoods and distortions—that have changed.

How has the "knowledge of the audience" evolved over the tenure of *Homo sapiens* on this Earth? For more than 95 percent of our history, knowledge was limited but was tested daily against reality. The hunter-gatherer who picked a basket of poisonous berries was soon eliminated from the gene pool, as was the youth who led his kin toward the hungry lions instead of the grazing gazelles. Those few who parsed the patterns of the stars and so could predict the wildebeests' migration were accorded special veneration (we used to call them "experts"). There was also, no doubt, much misinformation abroad in those halcyon days—lightning evinced the anger of the gods, and neighboring kin groups were largely shunned as the hostile "other," whether they were hostile or not. But with simple survival as the foremost concern, the "knowledge of the audience" in general comported well with reality.

The average citizen today lives in a very different world. As Arthur C. Clarke's celebrated third law has it, "Any sufficiently advanced technology is indistinguishable from magic," and such magic permeates and defines the world of the typical American adult. From self-parking cars and GPS to iPads, airplanes, and LASIK surgery, most people have no clue how the technology that envelops them works or what physical principles underlie its operation—it is, truly, "indistinguishable from magic." And, living in this magical world, the "limits of plausibility" are easily expanded. If the talking box on your dash-

Public prevarication, then, is nothing new. What is novel is the technology-saturated environment in which it is now embedded. It is the "knowledge of the audience" and the "limits of plausibility"—not the falsehoods and distortions—that have changed.

board knows exactly where you are and can tell you how to get where you are going, why should talking to dead relatives not be plausible? If shining a light in your eye can eliminate your need for glasses, why shouldn't wearing magnets cure your arthritis?

If a scientific "expert" tells you that magnet therapy is nonsense, he's just exemplifying Clarke's first law: "When a distinguished elderly scientist . . . states that something is impossible, he is very probably wrong." And since the magnets worked wonders for your sister-in-law's best friend, they will probably work for you. If most of one's world is indistinguishable from magic, it is both reasonable and practical to adopt magic as an operating principle. And since only wizards understand magic, consulting them (the homeopaths, the astrologers, the mediums, and the mystics) makes perfect sense.

While the democratization of both access to knowledge and the ability to contribute to it provided by the Internet has obvious benefits, it also has a very serious downside.

Thus, the "limits of plausibility" have vanished, and the "knowledge of the audience" is constructed from Facebook feeds, personal experience, and anecdote. The average American is largely insulated from the physical reality his ancestors were forced to confront daily and, as such, resides in a world of self-reinforcing magical thinking.

What we have entered, then, is not the "post-factual" or "post-truth" era but the Misinformation Age. Facts still exist. Good approximations of the truth can still be found. And information has never been more plentiful: IBM calculated a few years ago that we generate 2.5 quintillion bytes of information per day, enough to fill a bookcase half a kilometer tall and stretching around the Earth at the equator—every day. How much of that information is nonsense is anyone's guess. The problem is that everyone feels equally well-qualified to make such a guess and then post it on their blog where it becomes their personal version of the truth that can be easily shared and propagated. And that's how misinformation begins.

There was a time when most people writing on a particular topic did so because they had acquired some degree of specialized knowledge. They had read what was already known about the subject, had conducted some observations or even experiments of their own, and had concluded they might have something to contribute to the advancement of our understanding of the topic at hand. They might even be said to be an "expert" on the subject. The Internet has exploded this model. While the democratization of both access to knowledge and the ability to contribute to it provided by the Internet has obvious benefits, it also has a very serious downside.

Tom Nichols, writing in the *Federalist* (Nichols 2014), describes this downside as "The Death of Expertise," which he characterizes as "a Google-fueled, Wikipedia-based, blog-sodden collapse of any division between professionals and laymen, students and teachers, knowers and wonderers—in other words, between those with any achievement in an area and those with none at all."

This, he says, creates a culture in which "everyone's opinion about anything is as good as anyone else's." Thus, Jenny McCarthy can state that her "mommy instinct" is far superior to scientific medical evidence on vaccination safety, and millions of Google-fed zombies nod in agreement and back up their foundationless opinions from a treasure trove of misinformation and related nonsense on the Internet.

This cornucopia of misinformation feeds another great American pastime: conspiracy theories. A recent survey (Poppy 2017) of 1,511 American adults found that 54 percent believe the 9/11 attacks involved a U.S. government conspiracy, while 42 percent believe global warming is a conspiracy or a hoax—the same percentage who believe in alien encounters. Thirty percent believe President Obama was born in Kenya. I was a little surprised to see that only 24 percent believe the Moon landings were a hoax, but perhaps the

Apollo program has faded so far from the collective memory that no one cares anymore. Most interesting was the result that 32 percent believe the North Dakota crash was a government cover up—despite the fact that the researchers completely fabricated an incident they called the "North Dakota crash" and inserted it into the survey to see how many respondents view everything as a conspiracy.

For those of us still convinced that facts about the physical world can be discovered and that a rational analysis of those facts can be useful in creating predictive models of that world, a counterinsurgency seems in order. Where should we begin?

Science is the most powerful intellectual tool humankind has yet invented. Unlike the comforting certainty other worldviews provide, science recognizes its facts as contingent and its models as limited in their application. It is important to realize, however, that science is, at once, both a system for fact discovery and a set of values—skepticism, a reliance on evidence, interpretation using deductive and inductive reasoning, etc. Scientists hold that both the fact-discovery system and these values are crucially important. But, since values are a touchy subject with most people and are at best indirectly testable against reality, it is likely wisest to defer to Jonathan Swift's dictum that "Reasoning will never make a man correct an ill opinion, which by reasoning he never acquired" (Swift 1721), and leave the values part aside for now. My recommendation for an opening gambit in a counterattack on the Misinformation Age is to stick to the facts.

For these purposes, my definition of a simple fact is a measurement of some physical quantity, performed with the best available instruments according to a precisely defined procedure, quoted with an associated uncertainty, and passed through a skeptical review, preferably one that repeats and verifies the measurement. A compound fact can be deduced from a number of simple facts.

A good example of a compound fact is the statement that the dominant component of the CO_2 currently being added to the atmosphere arises from the burning of fossil fuel. I have given many classes and public talks on the subject of climate change, and while my audiences have not all agreed with my conclusions about the gravity of the situation or my proposals for mitigation, I have yet to encounter objection to this fact once I take the time to carefully lay out the evidence. I proceed as follows:

STEP 1

I describe how we can count atoms and molecules, one by one, and show a table that lists the numbers of each kind in a sample of a million particles of air. This counting process is, of course, quite remarkable (bordering on magic?), but since most audiences have no concept of the size of an atom (and thus how remarkable it is that we can count them one by one), they can accept the atmospheric concentrations as facts, since counting is a straightforward process everyone understands.

STEP 2

I show the first two years of the Keeling curve of CO_2 concentration from 1958 and 1959. This plot shows the number of CO_2 molecules rising steadily from October to May, and then falling symmetrically from May through September. A discussion of how plants breathe in CO_2 and breathe out oxygen during the growing season, and then how bacteria break down the plant tissue and release CO_2 in winter, is also a plausible story that is readily accepted. When a keenly thoughtful person objects because the southern hemisphere has opposite seasons, I reward the thoughtfulness and then show a map of the world pointing out how much more plant-covered land area there is in the temperate zone of the northern hemisphere versus that same zone in the southern hemisphere.

STEP 3

I show the entire fifty-eight years of the Keeling curve in which the monotonic trend upward dwarfs the seasonal fluctuations. I then pose the question: How can we know where this additional CO_2 is coming from?

STEP 4

I show the O_2 concentration in the atmosphere as a function of time. The decline in O_2 is a

surprise to almost everyone but is unmistakable in the data, as are the seasonal fluctuations that are perfectly out of phase with the CO_2 annual pattern. Here I reiterate the plants' CO_2 to O_2 respiration so everyone is comfortable with it—it is always good to tell people something they know, even if they just learned it five minutes ago, as it keeps them engaged with the line of argument. The interesting point to make here is that the amount of O_2 that has disappeared is just equal to the amount needed to explain the CO_2 increase *if* the CO_2 comes from the combustion (combining with oxygen) of carbon-containing material: C plus O_2 equals CO_2. It is important to note that this is just a correlation and cannot be interpreted as causation—emphasizing the care with which we are accumulating facts and not jumping to conclusions.

STEP 5

A digression into isotopes is now required—in particular, that carbon has three common isotopes (C-12, C-13, and C-14). I emphasize how these isotopes are chemically identical but that the heavier ones move more slowly and are thus discriminated against in chemical reactions. This explains why plants have less C-13 and C-14 than does the air they breathe. I also provide a brief introduction to radioactive decay to explain how C-14 gradually converts to plain old nitrogen, the dominant constituent of the atmosphere, on a timescale of 5,730 years.

STEP 6

The penultimate data points are the ratios of C-13 and C-14 to C-12, both from direct measurements of the atmosphere over the past forty years and from tree rings going back many centuries. These data show a gradual decline in the C-13/C-12 ratio beginning round 1800 at the start of the industrial revolution that accelerates rapidly over the past few decades, just as the total CO_2 skyrockets. The C-14/C-12 ratio has also been declining rapidly over the past thirty years. By providing pictures of the various sources of carbon (CO_2 from volcanoes and ocean-air exchange, as well as C from living plants, nuclear bomb tests in the atmosphere, and that long-dead plants equal fossil fuels), I am ready for the inescapable conclusion.

STEP 7

The declining ratios rule out volcanoes and ocean-atmosphere exchange, since both have higher C-13/C-12 ratios. The falling C-13 values means plants must be involved. The plunging C-14 values mean we must be adding CO_2 to the air that is highly deficient in C-14 and that can't come from modern plants whose C-14 was enriched by the bomb tests in the 1950s. It must come from long-dead plants in which the C-14 has all decayed away. Thus, the dominant fraction of the new CO_2 in the atmosphere must come from burning fossil fuels. QED.

The Misinformation Age provides poor support for individual decision making and poses a potential disaster for the formation of rational public policy. A counterinsurgency is definitely called for.

In my experience, this approach has two virtues. First, for all but the most committed science deniers, it establishes the unequivocal role of humans in changing the composition of the atmosphere. Second, it illustrates the process of uncovering facts about the world. I do *not* tout dire predictions about the future of the planet, nor do I suggest policy prescriptions to solve this problem. The former are far too uncertain to constitute "facts," and the latter involves values about which reasonable people may differ. But starting with a fact on which we can agree establishes both a point of connection and a reality-based platform for further discussion.

The Misinformation Age provides poor support for individual decision making and poses a potential disaster for the formation of rational public policy. A counterinsurgency is definitely called for. But our actions will be ineffective if they are politicized (Foster 2017) and unpersuasive unless we scrupulously abide by the principles of a scientific mind. The reproducibility problems in biomedical research (Begley and Ellis 2012) and, more recently, in psychology (Nousek et al. 2015) undermine our credibility. Participation in—even cultivation of—media hype over scientific findings is likewise extremely unhelpful. Assertions of authority will (and perhaps should) be ignored. The power of science lies in its skeptical, rational, evidence-based approach to understanding the world. This power begins with facts, and, in my experience, these facts are the best tools with which to start the revolution. ■

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David J. Helfand is a professor of astronomy at Columbia University and a CSI fellow, as well as past-president of the American Astronomical Society. His recent book, *A Survival Guide to the Misinformation Age*, enumerates the scientific habits of mind needed for the counter-revolution.

Statin Denialism

The benefits of statins far outweigh their risks, but public perception has been skewed by alarmist misinformation from statin denialists.

HARRIET HALL

When Richard Dawkins was asked to justify his belief in the scientific method, he answered, "It works, bitches!"[1] When the scientific evidence is compelling, one would have to be willfully perverse to reject it. But some people do; they reject findings that don't fit with their ideology. We call them denialists. We have climate change denialists, HIV/AIDS denialists, vaccine denialists, evolution denialists, even germ theory denialists. And we have statin denialists.

Statins work, bitches! But the public perception has been skewed by alarmist misinformation from statin denialists.

A Hilarious Example of Statin Denialist Propaganda

Statin denialists rely on "alternative facts"; in other words: lies. The worst example of anti-statin misinformation I have ever seen is a YouTube interview with Dr. Leonard Coldwell. Not a word of what he says is true, and much of it is hilariously funny. Some of his statements are so obviously ridiculous that it's hard to believe they wouldn't leave even the most scientifically naive viewer rolling on the floor. Who is Leonard Coldwell? He has no medical or scientific credentials, yet he claims to be the world's leading authority on cancer and to have treated over 35,000 cancer patients with a 92.3 percent cure rate. I think even Alice's White Queen, having practiced believing as many as six impossible things before breakfast, would find that hard to swallow.

For your entertainment, I will provide the complete transcript of Coldwell's deliciously absurd video[2] along with my reality checks that are italicized and noted in brackets. To begin with, the interviewer says a number of statins have been pulled off the market.

[A little rudimentary fact-checking reveals that the number of statin-containing products removed from the market is three, and two of those were mixtures of statins with other drugs. The statins in those mixtures remain on the market, so the true number is one: Baycol, or cerivastatin, was voluntarily withdrawn from the market when post-marketing surveillance showed that it was five to ten times more likely than other statins to cause a serious complication, rhabdomyolysis.]

When the interviewer asks his opinion of statins, Coldwell says: "It's mass murder. *[Murder is premeditated killing. Does he really think doctors are deliberately trying to kill patients?]* It always leads to hardening of the liver, *[No, statins actually* reduce *the risk of cirrhosis of the liver.[3]]* it cuts off at least twenty years of your life span. *[Nonsense! It does just the opposite, particularly for patients at high risk of cardiovascular events.]* Your brain is made from cholesterol. *[Maybe if you're a fathead! For the rest of us, our brain is made of a lot of other things in addition to cholesterol.]* Statin is a cholesterol-lowering drug. So, if you want to have a brain that's the size of a marble, keep on taking them. *[Whaaat? No one has ever had a brain that's the size of a marble for any reason; and the brains of patients on statins are the same size as the brains of patients not on statins.]* You do not die of too much cholesterol, you die of not enough. *[You don't die of either; you die of heart attacks and strokes, and reducing high*

cholesterol levels reduces your risk of those events.] There is no such thing as too much cholesterol. *[Yes, there most certainly is. People with familial hypercholesterolemia die prematurely.]* In a burn unit, we use twenty to twenty-eight hard-boiled eggs a day, in a burn victim, *[He just made that up.* No *burn unit does that, and if they tried it, the patients would surely rebel.]* because we know only cholesterol builds healthy cells. *[*Only *cholesterol? How silly! A lot of other components are required to build healthy cells.]* Every cell in your system, 87 percent of the new cell, is built from cholesterol. *[No, it isn't! Lipids account for half the mass of cell membranes, and cholesterol makes up 20 percent of those lipids.[4]]* Where does this cholesterol come from? They just made up the number of 250; they just made it up. *[No, they didn't! They measured cholesterol levels in large populations and found that people with higher levels of cholesterol were more likely to have heart attacks.]* There's no science, no nothing. They tested a couple of people living in a trailer park, from trash that they eat, *[That's insulting to people who live in trailer parks, and it's demonstrably not true. Much of the original information about cholesterol and cardiovascular risk came from a large study that recruited a cross-section of people living in Framingham, Massachusetts, a prosperous town with no excess of trailer parks.]* and they came up with the average is kind of like 250 of combined cholesterol. And that's what everyone should have. *[No one is recommending that everyone have 250 of combined cholesterol. Risk is determined not just by total cholesterol but by levels of "good" HDL cholesterol and "bad" LDL cholesterol, and of other lipid subfractions, as well as other risk factors such as smoking and diabetes.]* It's completely artificially made up. *[No, it's based on solid science.]* I have patients who have a cholesterol of 600; they're the healthiest people, never been sick." *[Never been sick* yet. *Patients with a cholesterol of 600 are at high risk of cardiovascular events and death, and it is irresponsible for a doctor not to treat such high levels.]*

Incredible Silliness about Salt

"And you know where the myth comes from? People take table salt. Table salt is one-third glass, one-third sand, one-third salt. So now, the glass in the table salt is cutting the arteries. Now you're bleeding to death internally. Now the cholesterol goes there and stops the bleeding. Keeps you alive, saves your life. The cholesterol is the bad guy because it narrows, of course, it clogs an open wound, that's bleeding; of course it narrows for a short amount of time, the blood way. And then they say, oh yeah, because it's now narrowed, it's raising your blood pressure, and what's raising your blood pressure is causing the narrowing. It's the cholesterol, therefore, cholesterol is causing high blood pressure. Oh, very interesting."

[This is by far the funniest part of the whole interview. Think about it. In the first place, the FDA tests salt and requires that all U.S. table salt be at least 97.5 percent pure sodium chloride. If table salt were one-third glass shards, wouldn't you notice sharp particles in your salt? Wouldn't it cut your tongue and mouth? Sprinkle some into your hand and see if anything feels sharp. If you swallow glass and sand, they might irritate the lining of the gastrointestinal tract; but then they would be eliminated in the feces. There is no way they could be absorbed into the blood stream and find their way to the coronary arteries.

This whole idea is a ridiculous urban myth that not even Mythbusters *would take seriously enough to test; but anyone could easily test it in their own kitchen. Sand and glass are not soluble in water. If table salt were one-third sand and one-third glass, dissolving it in water would leave an insoluble residue comprising two-thirds of the original amount. The RationalWiki article on Leonard Coldwell says, "He has precious little understanding of medicine or human biology, and his understanding of basic science is virtually non-existent: any man who genuinely fails to understand the fact that glass and sand are not actually soluble in water is probably not best placed to offer health advice."[5]]*

Coldwell Continues Blathering

"So, the statin drugs are the most dangerous, useless drugs ever invented, *[Doesn't he know anything about the history of medicine? It would be trivially easy to identify drugs that were far more dangerous and totally useless.]* and please remember your brain is built from cholesterol. 92–99 percent of the brain is built from cholesterol. *[No, it isn't! Our brain is 60 percent fat, with around 25 percent of that being cholesterol, mostly in the myelin that sheathes the neurons' axons.[6]]* Every statin drug starts shrinking the brain. *[No statin drug shrinks the brain. In fact, statins may have a protective role in the development of dementia. A recent meta-analysis of observational studies showed they were associated with a significantly lower risk of Alzheimer's disease.[7]]*

And this is what people need to understand. Just have a couple of bananas on an empty stomach in the morning and you will see your liver get so much better really, really fast. It works so much better. Just help your body. *[A non sequitur. There is no evidence that eating bananas can reverse liver disease, and how on Earth did he manage to segue from heart disease to liver disease?]* You don't need to cure it; you don't need to fix it; just help it. It cures itself. Because my statement, there's no healing force outside the human body, always comes true at the end of the day. There's absolutely no healing force outside the human body. *[No one claims statins "heal" or "cure" anything. They simply reduce the risk of cardiovascular events.]* So, every time they tell you there's a magic pill, *[No one is suggesting statins are magic pills; they are drugs with risks and benefits, and the benefits have been determined to outweigh the risks.]* and do you know why they always take the drugs off the market? When they become free or generic and they don't need the big bucks." *[Several statins are now off-patent and available as generic drugs. Not one of those has ever been taken off the market.]*

No one with a modicum of education in science and critical thinking would believe Coldwell's claims. Even uneducated people with the tiniest bit of common sense ought to at least question the claim about salt being two-thirds sand and glass. And yet people do believe him and repeat his falsehoods.

Other Sources of Misinformation

Leonard Coldwell is far from the only one spreading "alternative facts" about statins. Joseph Mercola[8] says "Cholesterol is NOT the cause of heart disease." And "if you take statins, you MUST take CoQ10." He claims that statins impair

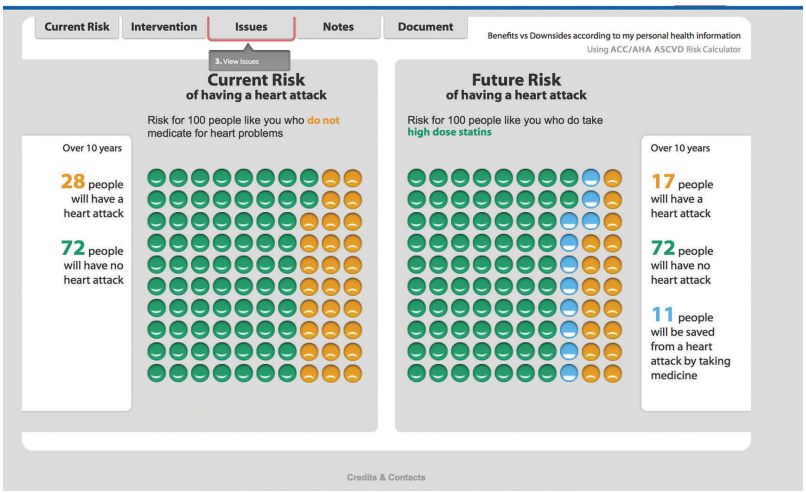
Current Risk
Intervention
Issues
Notes
Document
Benefits vs Downsides according to my personal health information
Using ACC/AHA ASCVD Risk Calculator
3. View Issues
Current Risk
of having a heart attack
Risk for 100 people like you who do not medicate for heart problems
Over 10 years
28 people will have a heart attack
72 people will have no heart attack
Future Risk
of having a heart attack
Risk for 100 people like you who do take high dose statins
Over 10 years
17 people will have a heart attack
72 people will have no heart attack
11 people will be saved from a heart attack by taking medicine
Credits & Contacts

Figure 1. Illustration of the Mayo Clinic visual decision aid available online.

numerous biological functions, including all your sex hormones. He says ninety-nine out of 100 people do not need statins. He says that statins are teratogenic, that they cause birth defects if taken during pregnancy. The evidence says otherwise.[9]

Mike Adams, the Health Ranger, cherry-picks the literature and writes alarmist headlines about statin studies on the Natural News website. Typical examples: "Drug's benefits were 100% fabricated," "Statins are totally worthless," "Statins cause debilitating muscle pain in up to 40%," "Lowering cholesterol has NO EFFECT on risk of heart disease or death," "Flu vaccines are useless to people taking statin drugs—and both cause brain damage." When you consult the actual studies he refers to, you will find that his headlines misrepresent their findings. He even repeats the nonsense about sand and glass in table salt.[10]

And then there is the International Network of Cholesterol Skeptics (THINCS), a group that disputes the role of cholesterol in cardiovascular disease. They are led by Uffe Ravnskov, author of *The Cholesterol Myths*, and Malcolm Kendrick, author of *The Great Cholesterol Con.* They cherry-pick the scientific literature to find studies that support their theses, ignore the flaws in those studies, and ignore the vast body of literature that contradicts them. In *The Skeptic's Dictionary*, Bob Carroll explains how they use distortions and deceptive techniques in their arguments.[11]

What Is the Evidence for Statins?

Statins have been extensively studied; a PubMed clinical query brings up over 30,000 published articles. I couldn't possibly read them all, but expert panels and review articles have done the heavy lifting and have identified the studies worth reading. The panels not only read all the pertinent studies, both pro and con, but they critically evaluated the methodology and the credibility of their findings. A 2016 review in the *Lancet* was particularly thorough. It found that the benefits of statins have been underestimated. The evidence couldn't be clearer: they reduce the rate of heart attacks and strokes in at-risk patients by as much as 50 percent in some cases.[12] Low-cost statins (about £2 for a month's treatment) reduce LDL cholesterol by more than 50 percent. Large-scale evidence from randomized trials shows that for every 1 mmol/L reduction in LDL cholesterol with statin therapy, there is a proportional reduction of about 25 percent in the rate of major vascular events (coronary deaths, heart attacks, strokes, etc.) during each year that statins are used. Lowering LDL cholesterol by 2 mmol/L reduces risk by about 45 percent. Lowering LDL cholesterol by 2 mmol/L with statins for five years in 10,000 patients would prevent major vascular events in 1,000 patients at high risk and 500 patients at lower risk.

Statins may not work only by lowering cholesterol. Statins also have anti-inflammatory effects that probably contribute to the reduction in cardiovascular events. But the authors of the *Lancet* article felt there was sufficient evidence from various sources to establish a causal relationship between cholesterol and atherosclerosis. They noted that lower concentrations of cholesterol have been associated with higher death rates, particularly in the elderly (something the statin denialists love to point out), but they say those associations can be shown *not* to be causal.

The problem is that we only have population statistics. We can't predict which individuals will benefit from statins, so we have to treat everyone at risk. That means that a lot of individuals who take statins will not benefit. One way to look at the data is to calculate the NNT, the number of patients needed to be treated for one patient to benefit. By one estimate, the NNT to prevent one heart attack in patients who already have heart disease is sixteen to twenty-three, to prevent a death, forty-eight. For patients who have risk factors but don't yet have heart disease, the NNT is between seventy and 250.[13] These are overall estimates for populations; the actual NNT will vary according to the individual's personal risk factors. Visual decision aids[14] are available online where you can input an individual's cholesterol, blood pressure, and other risk numbers and get an easy-to-interpret diagram like the example from the Mayo Clinic in Figure 1.

Expert panels have repeatedly evaluated all the available evidence. In 2013, the American College of Cardiology and the American Heart Association jointly issued extensive treatment guidelines based on that evidence.[15] The magnitude of the benefit is small, but it is greater for patients at higher risk. And if you are one of the patients who are saved from a heart attack, the benefit is pretty important. The guidelines are not prescriptions; they are intended to be used as general guidelines to facilitate interpretation of the evidence for the individual patient. Science can provide evidence about benefits and risks, but ultimately patients must choose whether to take the drugs and whether the benefits outweigh the risks for them, personally. People's willingness to take risks varies, as does their attitude about insurance.

What about the Side Effects?

Any drug that has effects is likely to have side effects, and clinicians always weigh the benefits against the risks. What's more, drug manufacturers have to demonstrate that the benefits outweigh the risks before the FDA ever approves a drug for marketing. That same review article in *Lancet* found that the adverse effects of statins have been overestimated.[16] Devastating side effects have been reported, including cancer, dizziness, depression, anemia, acidosis, pancreatitis, cataracts, heart failure, hunger, nausea, sleep problems, memory loss, ringing in the ears, "a sense of detachment,". . . the list goes on. But these are from anecdotal reports and uncontrolled observations.

When symptoms such as these have been evaluated in controlled studies, they have not been shown to occur more often with the drug than with placebo. The *Lancet* article concluded, "The only excesses of adverse events that have been reliably demonstrated to be caused by statin therapy are myopathy and diabetes mellitus, along with a probable excess of haemorrhagic stroke. These excesses are larger in certain circumstances, but the absolute risks remain small by comparison with the absolute benefits." Treating 10,000 patients for five years might cause five cases of myopathy, fifty to 100 new cases of diabetes, and five to ten hemorrhagic strokes. The increase in hemorrhagic strokes is outweighed by the much greater decrease in ischemic strokes, and the clinical relevance of new diabetes diagnoses is minimal when weighed against the benefits of statin therapy. And a meta-analysis of subsequent studies found that the risk of diabetes was lower than in the study that first reported it.[17]

There are a lot of reports of muscle pain and weakness, but there is good evidence that most of them are not related to statin therapy. Out of 10,000 patients treated, only about ten to twenty will develop muscle pain and weakness, and only one of those will be diagnosed with myopathy requiring statin discontinuation. Only two to three cases of the serious complication rhabdomyolysis will be diagnosed for every 100,000 patients treated. The harmful effects of statins can usually be reversed by stopping the drug. If you don't take statins and have a heart attack or stroke, those are not reversible.

Statin Denialism Harms Patients

Irresponsible media reports of statin side effects have frightened a lot of patients into discontinuing their treatment. Recently in the United Kingdom, following publication of exaggerated claims about statin side effects, more than 200,000 patients stopped their statins. By one estimate, this is likely to result in 2,000 to 6,000 cardiovascular events in the following decade that could have been prevented.[18]

Why Denialism?

Why do statin denialists rely on "alternative facts"? What motivates them to reject evidence that the majority of the medical and scientific community have reached a consensus on? I don't think there's a simple answer, but I suspect part of the problem is an anti-establishment ideology that automatically rejects anything that comes from Big Pharma or mainstream medicine, and sometimes even invents conspiracy theories. Another part is that so many people want to believe that if you just eat right, you won't ever get sick, and that there must be natural lifestyle solutions to every health problem. There aren't.

Other factors that can motivate denialism are religious ideology, self-interest (financial, political, economic), and the desire to protect oneself from unpleasant truths by denying reality. And of course, people who don't understand how science works are more likely to reject it; they won't accept the consensus of experts because they see it as nothing more than "opinion."

Denialists are welcome to their poorly informed opinions, but they are not welcome to their "alternative facts." Global warming is real, germs cause disease, HIV causes AIDS, evolution is an established fact, vaccines save lives. And statins, while they are not a panacea for everyone, have been clearly shown to do more good than harm for patients at risk.

Statins: They work, bitches! ■

Notes

1. The full Dawkins quotation is "[Science] works! Planes fly. Cars drive. Computers compute. If you base medicine on science, you cure people. If you base the design of planes on science, they fly. If you base the design of rockets on science, they reach the moon. It works . . . bitches." The saying "Science: It works, bitches" originally appeared in an xkcd cartoon and on a T-shirt, illustrated by a graph showing a perfect correlation between data from the COBE mission and Planck's predictions for black body radiation.
2. https://www.youtube.com/watch?v=9trx6opxmBI
3. https://www.ncbi.nlm.nih.gov/pubmed/27166128
4. http://www.nature.com/scitable/topicpage/cell-membranes-14052567
5. http://rationalwiki.org/wiki/Leonard_Coldwell
6. https://www.psychologytoday.com/blog/iage/201402/cholesterol-and-our-aging-brain
7. http://atvb.ahajournals.org/content/24/5/806
8. http://articles.mercola.com/sites/articles/archive/2010/07/20/the-truth-about-statin-drugs-revealed.aspx
9. https://www.ncbi.nlm.nih.gov/pubmed/22390808
10. http://blogs.naturalnews.com/the-truth-about-salt/
11. http://skepdic.com/refuge/bunk28.html
12. http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31357-5/fulltext
13. http://pharmamkting.blogspot.com/2008/01/statin-lottery-number-needed-to-treat.html
14. https://statindecisionaid.mayoclinic.org
15. http://circ.ahajournals.org/content/circulationaha/early/2013/11/11/01.cir.0000437738.63853.7a.full.pdf
16. http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31357-5/fulltext
17. http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)61965-6/fulltext
18. https://www.ncbi.nlm.nih.gov/pubmed/27353418?dopt=Abstract

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Vaccines, Autism, and the Promotion of Irrelevant Research: A Science-Pseudoscience Analysis

Proponents of the vaccination-autism link have created a bogus scientific debate by providing lists of studies that supposedly support their claims. In actuality, these studies are typically questionable or irrelevant. We identify this as its own developing pseudoscientific tactic: the promotion of irrelevant research.

CRAIG A. FOSTER and SARENNA M. ORTIZ

Larry Kusche's review of the Bermuda Triangle mystery (1986; 2015) provided one of the clearest victories for reason over rumor. His method remains convincing because it was so straightforward. Kusche demonstrated that many disappearances had been wrongly attributed to the Bermuda Triangle; the actual events either did not happen as reported or likely occurred outside of the infamous area. Kusche also demonstrated that the rate of actual disappearances within the triangle did not seem to differ meaningfully from the rate of disappearances in other parts of the ocean. In so doing, Kusche highlighted two issues that occur frequently in pseudoscience. The first involves reporting events inaccurately, and the second involves relying on handpicked observations rather than a representative set of observations (Hansson 2013).

Vaccinations and Autism: Inaccuracies and Anecdotes

Much of the debate surrounding vaccines and autism has been similarly based on straightforward considerations about whether the reported evidence is accurate and whether a representative set of evidence supports the vaccines-cause-autism claim. This debate was triggered by Andrew Wakefield and others' (1998—Retracted) research involving twelve children who were referred to a pediatric gastroenterology unit. Wakefield et al. reported that all twelve children had experienced developmental problems at varying intervals after exposure to the measles, mumps, and rubella (MMR) vaccine; nine of these developmental disorders were identified as autism with a tenth being questionably identified as autism. Wakefield et al. used these results to suggest that the MMR vaccine could contribute to a syndrome involving gastrointestinal problems and regressive autism. This research fueled the well-known concern about childhood vaccination and its alleged contribution to autism—a genie that shows no sign of returning to its bottle.

Even if the Wakefield et al. results had been legitimate, the small sample size and selective nature of the sample should have encouraged a cautious interpretation. Nevertheless, the evidence was at least broadly interpretable: a small group of children received the MMR vaccine and subsequently experienced developmental problems. Of course, this evidence was not accurate. Wakefield created fraudulent results presumably for financial reasons (Deer 2011). Subsequent research revealed no evidence that childhood vaccine administration elevated the rate of developing autism (Taylor et al. 2014). In the absence of any scientific connection between vaccinations and autism, promoters of the vaccines-autism link could still handpick observations. Anti-vaccination proponents pointed to the many vaccinated children who later developed autism (noted by The Logic of Science 2016). The best-known example has probably been actress Jenny McCarthy's son. In a strange twist, some have raised the possibility that McCarthy's son did not actually develop autism (Rubin 2008).

We view the handpicking of confirmatory observations

with understanding. It is natural for humans to seek explanations for difficult events, and the temporal proximity between a vaccination and the diagnosis of autism could certainly feel causal. Nevertheless, this aggregation of anecdotes, no matter how broad, is not science. Most objective observers can understand that if millions of children are vaccinated and a fraction of children develop autism, then many children who have been vaccinated will subsequently develop autism, even in the complete absence of any cause-effect link. Obviously, many people still believe that vaccinations cause autism, but at least the science and pseudoscience surrounding this debate remains relatively clear. The scientifically minded can point to the absence of any correlation between childhood vaccination and the development of autism. Proponents of the vaccines-autism link can point to the number of children who were vaccinated and later developed autism.

Vaccines and Autism: The Promotion of Irrelevant Research

This context is important for understanding an interesting tactic that subsequently developed regarding vaccinations and autism. The supposed science behind the vaccine-autism link came back. The vaccines-cause-autism community began offering several non-Wakefield studies as evidence of supportive science. As far as we can tell, this tactic was popularized by blogger Ginger Taylor in 2007 when she published a list of "just over a dozen studies" supporting the link between vaccines and autism (see Taylor 2013). This list has since expanded to well over 100 studies. Taylor's work is paralleled by other lists to include Walia's (2013) list of twenty-two studies, Adl-Tabatabai's (2015) list of thirty studies, and Anti-Vaccine Scientific Support Arsenal's (2015) list of twenty-six studies, the latter containing mostly perspectives and reviews. To illustrate the dissemination of this argument, the Activist Post's Facebook page, where Walia's list was posted on August 24, 2015, appears to have more than 500,000 followers presently. We do not need to address these studies specifically, as the collective implication of these studies has been debunked sufficiently by scientific research (e.g., see Taylor et al. 2014) and by scholars who have reviewed the concerns associated with many of these studies (e.g., Ditz 2013; The Logic of Science 2016).

Instead, our purpose is to highlight the promotion of irrelevant research as its own developing characteristic of pseudoscience. This tactic shares a connection with the old pseudoscientific tactic of using scientific-sounding language (Shermer 2002) because both tactics might make a community appear more scientific. Nevertheless, the promotion of irrelevant research goes much further by pointing to purportedly important scientific findings.

Radner and Radner (1982, 36) gave a nod toward the promotion of irrelevant research when they described the "grab-bag approach to evidence." According to Radner and Radner, pseudoscience will use quantity of evidence (the grab bag) over quality of evidence in an attempt to wear down opponents. Radner and Radner's grab bag focused mostly on the

continued offering of confirming observations (e.g., Bermuda Triangle disappearances) or questionable pieces of evidence (e.g., an old jet-shaped figurine as evidence of ancient aliens). Radner and Radner also included the misuse of research findings in their grab bag after explaining that pseudoscientists are reluctant to "weed out" bad evidence from a scientific debate. To illustrate, they noted that parapsychologists continued to use the results of a flawed research design as evidence for psi.

At the same time, Radner and Radner did not really describe the promotion of irrelevant research as a specific method for making pseudoscience look like science. This tactic, as it has been used in the vaccines-autism domain, involves much more than the inclusion of a dubious study or two that lie at or near the center of a science-pseudoscience debate. *The promotion of irrelevant research is an active aggregation of several questionable or peripherally related research studies in an attempt to justify the science underlying a questionable claim* (see also Barrett [2008], who mentioned this tactic briefly). It includes, among other things, (a) results that have dubious legitimacy, (b) results that possibly occurred due to chance, (c) results based on inappropriate statistical procedures that create a false perception of a relationship, (d) results coming from poorly controlled research, (e) results where the supposedly harmful aspects of vaccines were manipulated at much stronger levels than is actually present in a vaccine, (f) results where the dependent variable was tangentially related to autism but was not autism (e.g., gastrointestinal problems), and (g) results containing multiple explanations due to confounding variables (see Ditz 2013; The Logic of Science 2016).

The promotion of irrelevant research potentially changes the landscape of the overall discussion surrounding vaccines and their relation to autism.

The promotion of irrelevant research potentially changes the landscape of the overall discussion surrounding vaccines and their relation to autism. It can shift the argument away from the misuse of handpicked examples or a manageable number of fallible research designs (all the while ignoring the broader absence of any systematic link between vaccinations and autism). It can move the argument to an assortment of scientific findings with questionable relevance and legitimacy (all the while ignoring the broader absence of any systematic link between vaccinations and autism). By doing so, the vaccines-cause-autism community no longer ignores the entirety of the science regarding vaccines and autism. They have instead developed and promoted a scientific debate that does not actually exist in science. Instead, this bogus scientific debate takes place in an electronic world between people who are usually consumers of science rather than being scientists themselves. Among actual scientists, this does not seem to be an issue. Taylor et al. (2014), in their statistical integration of several studies that examined vaccination and autism development, referred to almost none of the studies provided in the lists of research supposedly supporting the vaccination-autism link. Other scientists who have conducted research involving vaccination and autism have demonstrated similar levels of disregard (e.g., Uno et al. 2012).

We can illustrate the promotion of irrelevant research by considering this development relative to other questionable health-related claims. A Google search for "studies that show that vaccines cause autism" revealed the four aforementioned lists within the first thirty-two non-advertisement results. A Google search for "studies that show that new age crystals" did not immediately reveal similar lists within the first thirty results. A Google search for "studies that show that chiropractic" did reveal lists of research supporting chiropractic medicine that appear similar to the lists used to promote the vaccines-autism link. Hall (2014) reviewed the top chiropractic studies of 2013 (Luck 2013) and offered several methodological concerns. There is, however, a critically important distinction between this debate and the bogus scientific debate in the vaccine-autism domain. Hall reviewed the top chiropractic studies as reported by a chiropractic website. This stands in obvious contrast to proponents of the vaccines-autism link pointing to a set of research findings that appear to be generally irrelevant to the actual scientific debate.

Why has the promotion of irrelevant research occurred so prominently in the vaccines-autism domain? The anti-vaccination movement boomed after the publication of what appeared to be legitimate scientific research (Wakefield et al. 1998—Retracted). This caused many individuals to become firmly entrenched in the vaccines-cause-autism view. This initial entrenchment was surely reinforced by not vaccinating children, encouraging others to avoid vaccinating children, or both. It is difficult to admit wrongdoing in this regard because the consequences involve the well-being of children. The debate is also interdependent because this issue involves the well-being of unvaccinated *and* vaccinated children. This interdependence likely gave vaccination supporters additional initiative to press the anti-vaccination community for scientific justifications.

The vaccines-autism link has also been more neatly debunked than other forms of health-based pseudoscience. The vaccines-autism link is more easily examined because the results are not complicated by psychological rather than physical explanations. For instance, chiropractic medicine is difficult to investigate because it is seemingly impossible to create a proper control condition where participants believe they received chiropractic treatment when they did not. The vaccines-autism debate is not complicated by a placebo effect in this way. In fact, the vaccines-cause-autism theory could subtly encourage autism spectrum disorder diagnoses in vaccinated children; of course, this pattern of results has not been

revealed in extensive scientific examinations (e.g., Taylor et al. 2014).

We also believe that the development of the Internet and social media has enabled this pseudoscientific tactic (see, e.g., Kata 2012). This promotion of irrelevant research has occurred overwhelmingly—possibly exclusively—in this context. The Internet provides quick access to a wealth of scientific and pseudoscientific information that allows groups on both sides of this debate to disseminate information swiftly and widely. This seems to have enhanced the ability of the scientifically minded to press supporters of the vaccine-autism link for the science behind their claims. Similarly, the Internet surely enhanced the ability for supporters of the vaccine-autism link to find and list several research studies that look, at first glance, as if they provide a noteworthy scientific argument. Taylor's (2013) original list was clearly intended to address concerns that there is no scientific evidence for the vaccine-autism link. If the Internet and social media hastened the promotion of irrelevant research, it explains why the Radner and Radner (1982) grab bag focused primarily on confirmatory observations and poor examples of evidence. It would have been difficult for nonscientists in 1982 to quickly piece together and share lists of any research that has some remote possibility of supporting a pseudoscientific claim. The continued ability for individuals to do so suggests that the promotion of irrelevant research is likely to continue as a pseudoscientific tactic.

The Internet provides quick access to a wealth of scientific and pseudoscientific information that allows groups on both sides of this debate to disseminate information swiftly and widely.

Pyrrhic Victories and Practical Implications

Unfortunately, the promotion of irrelevant research is intentionally or unintentionally clever because it can obscure the distinction between science and pseudoscience. Science advocates can explain fairly easily why handpicked observations or particular research designs might be misleading. It is more difficult for science advocates to address an extensive list of research findings that have dubious relevance and legitimacy. Yet if these lists are not addressed, newcomers might initially see science that purportedly promotes both points of view, which can create a sense of false equivalence (Skeptical Raptor 2015).

At the same time, entering this debate could create a series of Pyrrhic victories. Scientifically savvy individuals who critique the promotion of irrelevant research might win several battles while experiencing a setback in their overall campaign—a campaign that is waged with arguments rather than soldiers in an effort to promote reason rather than empires. Those who truly love science will be tempted to enter this debate knowing that they ultimately have a winning hand, but the vaccines-cause-autism community can offer a long list of weak counterarguments in the form of fraudulent research, poor research, tangentially related research, and alleged pro-vaccination conspiracies. Sadly, by the time the arguments about the science underlying vaccinations and autism are hashed out, newcomers to this issue might be understandably fatigued and confused about what they should believe (Radner and Radner 1982; Skeptical Raptor 2015). This can force science to rely on authority rather than a digestible explanation of the existing scientific evidence. Ironically, the reliance on authority to confirm belief is another tactic commonly associated with pseudoscience (e.g., Hansson 2013).

It might be wise for those who wish to promote science and reason to steer clear of the specifics associated with handpicked irrelevant research. Getting into the weeds of this debate might encourage people to believe that all scientific research endeavors are equally compelling and that the group with the greater number of supposedly supportive studies is the winner. It is probably more effective to keep the focus on the basic scientific principles that are more easily understood. If vaccines cause autism, then vaccinated children should be developing autism at an elevated rate compared to non-vaccinated children. There is no evidence of this pattern (see Taylor et al. 2014 for an introduction). The tangential findings provided by several questionable and legitimate studies consequently lack any substantial relevance. Only those who are really interested in the details of these generally irrelevant studies should bother with them. They can be directed to thoughtful reviews (e.g., Ditz 2013; The Logic of Science 2016).

Perhaps more important, the promotion of irrelevant research is, oddly enough, an acknowledgement that science matters. If science did not matter, there would be no reason to offer lists of supposedly supportive scientific studies. This creates two contradictory stances that the vaccines-cause-autism community can be asked to clarify. First, should decisions about vaccines and autism be based on the scientific evidence? It seems that some in this community believe that science matters (e.g., Taylor 2013) whereas others question the utility of science (e.g., Jameson 2015). Second, is there a conspiracy that stifles research supportive of a vaccine-autism link (e.g., Olmsted 2014)? If so, why are there so many published studies that supposedly support that link?

The answers to these questions need to be established before, not after, a debate ensues about whether science supports the vaccines-autism link. Clarifying the ground rules is clearly necessary because the vaccines-cause-autism community can claim that their science is legitimate but that

any science discrediting the vaccine-autism link is biased by some type of nefarious pro-vaccination agenda (see, e.g., Jameson 2015). This community can also argue that there would be additional research supportive of the vaccine-autism link if it had not been suppressed by a nefarious pro-vaccination agenda (see, e.g., Olmsted 2014; Mikkelson 2015). If the vaccines-cause-autism community wants to have a legitimate scientific debate, we are confident that members of the scientific community would be happy to entertain it. It just needs to come with a commitment that scientific findings cannot be omitted for undocumented impropriety and that suppositious research findings that have been suppressed by some unsubstantiated pro-vaccination agenda would not be considered.

Conclusion

The promotion of irrelevant research reveals a fundamental contradiction. It acknowledges the importance of science but disregards the most informative scientific studies and the general consensus of the scientific community. Our science versus pseudoscience analysis of this development serves two purposes. First, we hope that it encourages an effective response to the promotion of irrelevant research in the vaccines-autism domain. Second, we want to highlight the promotion of irrelevant research as an important pseudoscientific tactic in its own right. We believe that the promotion of irrelevant research will expand as a pseudoscientific tactic, and promoters of science and reason should therefore be prepared to identify and address it. ■

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(The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the United States Air Force Academy, the Air Force, the Department of Defense, or the U.S. Government.)

Helping Teachers Teach Evolution in the United States

The Teacher Institute for Evolutionary Science provides middle school science teachers with valuable science content and resources to improve evolution understanding in the United States.

BERTHA VAZQUEZ

Being a science teacher is the greatest job on Earth. Science can be a truly wondrous gift to share with young people. Although the day-to-day interaction can often feel like I am being pecked to death by ducks, I do not regret my decision twenty-six years ago to become a science teacher. I love working with young people and introducing them to humanity's best way of finding answers.

One of the most important things a teacher can do is build rapport with his or her students. Because I have my students for at least two years in a row, we develop a relationship built on trust and mutual respect over time. In my classroom, learning takes place in a welcoming environment, and this firm but friendly atmosphere is compromised only during one unit of study: evolution.

Richard Dawkins (2009) said it best in his book *The Greatest Show on Earth*. Imagine being a professor of Roman history who has to constantly, year after year, defend the very existence of the Roman Empire. Despite the overwhelming evidence coming from various sources—architecture, art, literature, etc.—your students are not only skeptical, they can be downright disrespectful. This is what teaching evolution feels like for many science teachers.

Like most teachers, I have at least a handful of students every year who are anxious about learning evolution. For example, many students raised in faiths that totally accept evolution ask whether or not they are "allowed" to learn it in my class. I've had students refuse to do any assignments related to evolution or who will sit with their backs to me for the entire evolution unit. This creates anxiety, not only in the students who are told at home that evolution is false but also in the other children in the room who do not understand what all of the fuss is about. Some students who completely accept and understand what I'm teaching are told by their families or pastors that they should not believe a word I say. Last year, an eighth grader came to me in tears after she defended evolution to her pastor who proceeded to call me a "disgusting human being."

TIES
TEACHER INSTITUTE FOR EVOLUTIONARY SCIENCE

Last year I was confronted by a parent during my school's annual Open House event. She asked if I believed in God. She told me that I was causing tremendous anxiety in her son because I began the school year with a series of lessons on the biology of skin color (see http://www.hhmi.org/biointeractive/biology-skin-color). Luckily for her son, she claimed, their pastor set him straight on evolution. She also stated that evolution was a religion and that there was no evidence for it. The other parents sat motionless, disbelieving what was happening. I remained calm throughout the exchange and responded that evolution was not a religion and that there are mountains of evidence for it. I politely asked her if we could

continue the conversation at a more appropriate time. Welcome to the world of the American science teacher.

The figures nationwide are disconcerting. When asked if they felt pressure to teach creationism in their classrooms, 31 percent of high school biology teachers reported that they did—and that this pressure comes primarily from students and parents. These pressures can be very stressful for teachers, who often teach evolution at the end of the year as a discrete topic instead of as the unifying theme of biology it actually is. Many teachers will begin their unit on evolution by saying to students, "You do not have to believe what I'm about to teach you. You just have to understand it and try your best on the test." One school district in Georgia even went so far as to create an opening activity with this message:

> This unit typically comes with some backlash from students and parents. It may help at the beginning of the unit to give students an analogy. . . . Ask students to turn to a partner and come up with a definition of a zombie. . . . Ask how many students believe zombies are real. . . . Next, do the same for aliens. Explain to the students that the class is going to be learning about evolution. We are not telling you that you have to believe in evolution. However, we are asking that you know enough about evolution to be able to explain the argument or definition to someone else similar to what you did for aliens and zombies. You can learn information about a topic or concept to have a conversation and answer questions without having to believe it. (Troup County Schools 2015)

I know this sounds unbelievable to somebody outside of education, but I understand what this school district is trying to achieve. This ice-breaker will most certainly help their science teachers avoid confrontation with anyone who does not "believe" in evolution. It's trying to help teachers avoid phone calls and visits from angry parents. Nonetheless, this school district is dispensing unacceptable advice to its science teachers. Both the Center for Inquiry and the National Center for Science Education attempted to contact this school district about this message to students, but neither received a response.

Teachers are by nature nonconfrontational. We prefer to avoid issues that will anger parents and students. This avoidance is even worse in middle school where it's possible a teacher may not have majored in the subject they are teaching. Middle school science teachers have to teach it all, from meteorology and space science to physical science. This means it's possible to have an excellent teacher with no life science background, for example, who has to teach evolution. Without a firm grasp of the subject matter, teachers are even less likely to take on a controversial subject head-on.

While improved science education is only one variable involved in increasing evolution acceptance in the United States, it is arguably a very important piece of the puzzle. After looking into the most effective ways to improve evolution education in America, the National Center for Science Education concluded that "requiring all teachers to complete

a course in evolutionary biology would have a substantial impact on the emphasis on evolution and its centrality in high school biology courses. In the long run, the impact of such a change could have a more far reaching effect than the victories in courts and in state governments" (Berkman et al. 2008). Biologist Sean Carrol points to the fact that acceptance of evolution is up to 68 percent among adult Americans under age thirty (it's 60 percent overall). He attributes the increased acceptance level among young people to the fact that "over the past decade, the concerted efforts of various academic and scientific organizations have led to greater emphasis in textbooks and curricula on the central place of evolution in understanding life" (Carrol 2014).

As a science teacher myself, I have seen firsthand how a good teacher can improve a student's understanding of a science topic. As a matter of fact, many school principals will tell you that they prefer hiring a good teacher with no science background rather than a scientist with no teaching experience. A good teacher can deliver the education once the content knowledge and resources are provided to them. The key is giving them the necessary content knowledge. This excerpt from Dr. Caitlin Schrein's interview with Stephanie Keep of the National Center for Science Education sums up this opinion.

> Teachers need to feel confident teaching the subject, as well. This confidence can come from education and training, but also from access to experts and high quality teaching resources. In my opinion, teachers who are really at the top of their game can teach just about anything as long as they have the resources to do so. There are many enthusiastic and knowledgeable science teachers who don't know specific areas of science, like evolutionary theory, through and through, but who are perfectly capable of teaching those subjects effectively when properly supported. (Keep 2016)

The above excerpt is at the heart of the Teacher Institute for Evolutionary Science (TIES), a project of the Richard Dawkins Foundation for Reason & Science. The purpose of TIES is to familiarize interested middle school science teachers with the concepts of natural selection, common ancestry, and diversity so that they may confidently cover the topics in their classrooms and fulfill their curriculum requirements. TIES introduces middle school teachers to the most important points of evolution and natural selection with a focus on the amazing advances of genetics. The success of TIES depends upon providing resources that teachers can begin to use immediately. Participating teachers or student teachers leave our workshops with presentation slides, labs, guided reading assignments, an exam, and a valuable resource list for their lesson plans. Our webpage is a one-stop shop for evolution education, and we constantly add new resources on our Facebook page as well.

Our teacher institute has modest beginnings. From 2012–2014, I decided to offer some professional development on evolution to my fellow science teachers at my own school. We often share new lessons and resources with each other. Through a series of sessions, the teachers developed a deeper understanding of modern evolutionary biology and received effective resources to use in their lessons. In November 2015, I had the opportunity to tell Richard Dawkins about my small efforts. To my great surprise and excitement, he offered to come to my school and help me present evolutionary biology to my colleagues. I'm pleased to say that my school district recognized the value of his tremendous offer and opened the event up to science teachers from across the school district. Over one hundred teachers came.

Shortly after the event, the executive director of the Richard Dawkins Foundation for Reason & Science, Robyn Blumner (she is now president and CEO of CFI), contacted me about recreating my local workshops into a nationwide project. The Teacher Institute for Evolutionary Science was born.

The purpose of TIES is to familiarize interested middle school science teachers with the concepts of natural selection, common ancestry, and diversity so that they may confidently cover the topics in their classrooms and fulfill their curriculum requirements.

Over the course of just two years, TIES has grown from one workshop in Miami, Florida, with one presenter to over forty-five workshops and seventeen different presenters. More than thirty more presenters have signed up for future presentations. TIES workshops have taken place across the United States, from Omaha, Nebraska, to Baton Rouge, Louisiana. In addition to addressing the middle school evolution standards in each presentation, TIES provides valuable sources of professional support. For example, the National Science Teachers Association (NSTA) has issued an excellent position statement on evolution education. Other sources, such as the National Science Foundation and the comprehensive Understanding Evolution website of the University of California at Berkeley can become essential when a science teacher is confronted with unhappy parents. The teacher can demonstrate that he or she is not the one responsible for setting the curriculum for the class and the parents will have to go elsewhere to complain. Having access to these resources takes the teacher "off the hook," so to speak.

TIES has other goals as well. First, it promotes teacher leadership at all levels of the education system. TIES enlists teachers to present to other teachers in local school districts,

at state science teacher conferences, and at NSTA conferences nationwide. In a profession where decisions are often made by noneducators, we believe that putting teachers in leadership positions is essential. Only a teacher knows the day-to-day struggles of classroom teaching. Second, TIES emphasizes modern-day examples of evolution. Sadly, many students are automatically turned off by Darwin's name, and anti-evolutionists have deliberately and falsely tried to discredit iconic examples of evolution (Gishlick 2003). A powerful example of the influence TIES can have in a classroom with this goal in mind occurred in April 2016. I teamed up with a local biologist, Dr. Eric von Wettberg of Florida International University. One of the participating teachers introduced herself by telling us that she doesn't really believe in evolution. She explained that she tells her students that they must study and get a good grade on the test so she can move on. I presented the standard TIES content in the morning. Dr. von Wettberg discussed his research in the afternoon. He explained that 20 percent of the world's population relies on the chick pea for its primary source of protein and that the yield of the chick pea crop around the world is declining due to climate change. His lab is attempting to cross the agricultural strains of the chick pea with the much more robust wild strain still found today in Southern Turkey and Northern Iraq. By introducing genetic variation into the agricultural strain, he is making it a hardier, more resilient crop. In other words, he is using the principles of natural selection to ensure that millions of people continue to have access to an important food source. Our disbelieving teacher left the workshop with a totally different perspective. We can be optimistic that her students will be receiving a very different view of evolution in her classes.

We encourage these evolutionary biologists to share their own research with the students, highlighting the idea that evolutionary science is a dynamic, vibrant field.

At the end of every TIES workshop, we ask the participating teachers for feedback. The teacher evaluations of TIES workshops have illustrated that TIES workshops are very well-received. TIES workshops provide content matter, ready-to-go resources, and support for science teachers. This participating teacher in central Florida sums it up very well in her evaluation:

> As a teacher without formal science background, I really appreciated your presentation during the FAST conference. I currently am in my first year as a seventh grade science teacher in St. Lucie County and was a bit nervous for the unit on evolution. I am very happy to say that your knowledge and enthusiasm for the subject have made me feel more prepared and excited to teach this subject to my students. (Sonia Veiga, workshop participant)

In September 2016, we at the Teacher Institute for Evolutionary Science decided to expand its scope in an effort to reach even more teachers and students. Our new TIES program is titled TIES Partnerships. We are enlisting interested evolutionary biologists who are willing to volunteer to visit schools in their local areas and present the basic concepts of evolutionary biology to middle or high school students. We encourage these evolutionary biologists to share their own research with the students, highlighting the idea that evolutionary science is a dynamic, vibrant field. The interested biologists are matched up with local science teachers in their area and the biologist/teacher pair set up the best dates and times for the classroom visits. Our TIES associates work closely with the biologists, ensuring that they understand the science standards of their state.

The Teacher Institute for Evolutionary Science has grown exponentially since its inception. Our mission now is to continue to reach out to science teachers across the United States and expand even further. As our motto says, "TIES is unlocking the wonders of life for teachers and their students." For more information, please visit our webpage at https://richarddawkins.net/ties/. ■

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Bertha Vazquez is a full-time teacher with twenty-seven years of classroom experience. She is also the director of the Teacher Institute for Evolutionary Science, a program of the Richard Dawkins Foundation for Reason & Science (now a part of CFI). For more information about becoming a TIES presenter or bringing a TIES workshop to your school district, please email Ms. Vazquez at bertha@richarddawkins.net.

Everything You Know about Being Rh-Negative Is Wrong

There are numerous claims regarding the Rh-negative blood type's origin, association with physical and personality traits, and potential disease resistance. Science does not support these claims.

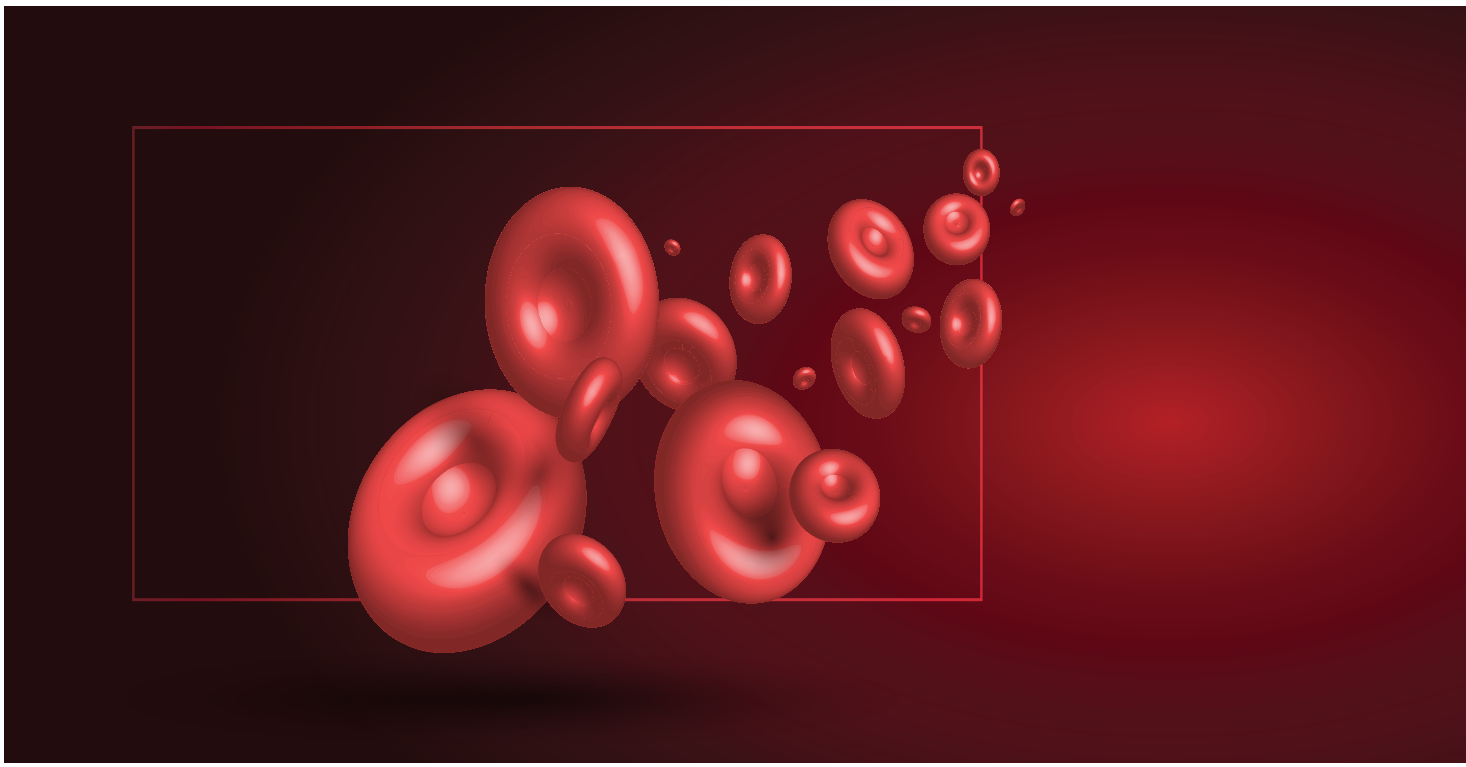
D. ELLEN K. TARR

The "+" or "–" following the ABO blood type indicates the presence or absence of a protein on the surface of human red blood cells (RBCs) that is referred to as the "Rh factor" (Rh for Rhesus); however, this protein is not found on the surface of Rhesus monkey RBCs. The human protein was renamed to "D antigen" over fifty years ago, but the original term and its connotations of a factor specifically shared between Rhesus monkeys and some humans have remained in use, despite the inaccuracy. The function of this protein was not immediately apparent, and there is a great deal of speculation on the implications of being Rh-negative versus Rh-positive. These include:

nonhuman/extraterrestrial ancestors, associations with physical traits, high IQ,sensitivity to psychic/paranormal phenomena, and disease resistance. The sense that Rh-negative individuals are special persists despite the lack of scientific data. My goal in this article is to address various claims regarding being Rh-negative.

Associations between Rh-Negative Blood Type and Physical Traits

Websites discussing the Rh-negative blood type have a general list of "known" associations: blue, green, or hazel eyes; red or reddish hair; low body temperature; low pulse; low (or high) blood pressure; extra rib or vertebrae; vestigial tail;



larger than average head/forehead; unexplained body scars; unclonable blood; heightened senses; sensitivity to heat/sunlight; and the ability to disrupt electrical appliances. I have not found any scientific articles that corroborate these "known" associations. As I'll demonstrate, a founder effect likely played a role in the greater proportion of Rh-negative individuals in European populations, and it is possible this also influenced the prevalence of other traits.

Red hair in humans is associated with changes in the melanocortin 1 receptor (*MC1R*) gene. *MC1R* plays a role in the relative expression of the pigments eumelanin (brown/black) and pheomelanin (red/yellow), and thus far it is the only gene that explains the normal variation in human pigmentation (Valverde et al. 1995; Rees 2000). Low eumelanin compared to pheomelanin is also responsible for fair skin that tans poorly, which reflects a decreased need for protection from ultraviolet radiation in climates with less sunlight and an increased need to absorb sunlight for Vitamin D production. The genetics of *MC1R* in hair and skin color have been reviewed (Rees 2003), and the variants conferring red hair occurred up to 80,000 years ago (Harding et al. 2000). Some Neanderthals had *MC1R* alleles that would have resulted in fair skin and red hair; one is likely Neanderthal specific (Lalueza-Fox et al. 2007), while another is shared with modern humans and may have originated in Neanderthals (Ding et al. 2014).

The major gene involved in blue vs. brown eye color is *OCA2*, which encodes a protein important for normal pigmentation. There are many variations affecting eye color, but a specific single nucleotide change in the upstream *HERC2* gene inhibits *OCA2* expression in the iris, leading to blue eyes. Nearly all blue-eyed individuals have this mutation, which may go back to a single individual in the Black Sea region living 6,000 to 10,000 years ago (Eiberg et al. 2008). Several other genes contribute to variation in eye color (none as influential as *HERC2-OCA2*), and a recent study shows positive selection for lighter skin, hair, and eyes in Europeans over the past 5,000 years (Wilde et al. 2014).

The perceived association between Rh-negative blood type and red hair, light eyes, and sensitivity to sunlight is probably due to shared European ancestry. An association between traits does not imply that one causes the other. A recent study of blood type, hair color, and eye color in relation to sexual orientation found that both male and female homosexuals are more likely to be Rh-negative, although the statistical test fell just short of significance (p=0.06). The conclusion is not that these two traits have a direct connection but that some genes influencing sexual orientation may be on the same chromosome as the D antigen (Ellis et al. 2008).

Associations between Rh-Negative Blood Type and Cognitive or Personality Traits

There are also "known" cognitive and personality trait associations: high IQ; a truth-seeking nature; a compassionate/empathetic nature; tendency toward empathetic illnesses (manifesting another person's symptoms); tendency toward healing professions; a sense of having a "mission" in life; a sense of not belonging/otherworldly feeling; tendency to have paranormal experiences; tendency to be easily shocked/scared; and an interest in space or science. As with the physical traits, I found very little information in the literature to support these claims. Two early studies showed no association between Rh and personality factors (Mai and Pike 1970) or between any blood type and IQ (Owen 1972). A more recent study of over 3,000 Czech draftees (males about twenty years old) showed that Rh-negative individuals scored lower for novelty seeking and higher for persistence; the study also showed a greater effect of age and smoking on some personality and health factors in Rh-negative individuals (Flegr et al. 2012). Although addiction is not mentioned on websites, a study showed that the AB and Rh-negative blood types were independently more frequent in opioid addicts vs. controls (Aflatoonian et al. 2011). IQ and personality traits require professional evaluation—there are multiple metrics available, and interpretation is not straightforward. Self-reporting of these traits is problematic because standards are not well defined, and individuals may interpret these traits differently.

Electromagnetic hypersensitivity (EHS) refers to the development of symptoms when exposed to low/background levels of electromagnetic fields (EMFs); EM sensibility is sometimes used to describe the ability to perceive low EMF levels, with or without symptom development. EHS is suggested as one explanation for some "paranormal" events as well as being a wider health concern. A meta-analysis concluded that most self-identified EHS individuals cannot perceive low-level EMFs under laboratory conditions, and there is no evidence that short-term exposure causes non-specific symptoms (Röösli 2008). Individuals who can perceive low-level EMFs may exist, but they haven't been identified or investigated for blood type.

Associations between Rh-Negative Blood Type and Disease Resistance

While interesting, most of the "known" associations have limited implications. In contrast, "known" associations with disease resistance can be dangerous, especially when there is no scientific evidence to support them. The most common claim is that Rh-negative individuals are immune to HIV infection, based on the presence of either HLA-B27 or the CCR5delta32 allele.

Human leukocyte antigen (HLA) genes encode surface proteins involved in presenting peptide antigens to T cells. These molecules are also called major histocompatibility complex (MHC) proteins. HLA-A, B, and C alleles encode class I MHC proteins that are found on all nucleated cells (this means they are *not* present on RBCs). Each individual has two HLA-A, HLA-B, and HLA-C alleles that are designated by group numbers (e.g., HLA-B*27). This group may contain proteins with amino acid changes that don't impact

serological reactions, designated with another set of numbers (e.g., HLA-B*27:05). Alleles with a different nucleotide sequence, but no amino acid changes, get a third set of numbers (e.g., B*27:05:01). B*27 allele variants have been associated with protection against some viral infections (including HIV), susceptibility to malaria and tuberculosis, and a predisposition for ankylosing spondylitis (an autoimmune chronic inflammatory disease). HLA-B27 associations are reviewed elsewhere (Sheehan 2010), and potential mechanisms have been described (Neumann-Haefelin 2013). While there is evidence for the association of the HLA-B27 allele with HIV protection, this protection is not absolute. Further, there is no evidence of association between HLA-B27 and Rh-negative blood type. Websites I examined that make this claim have a single source: "According to Randall Johnson at the Baylor College of Medicine in Houston, 'Only 7% of the US population tests positive for the HLA-B27 gene; this gene, found only in persons with Rh-Negative blood, can trigger the immune system to operate overtime at WARP SPEED in times of medical emergency.'"

This statement has not been verified, and I was unable to locate the Randall Johnson named; Randy L. Johnson, PhD, at the University of Texas is not the source for this quote (personal communication). These genes are not on the same chromosome (HLA genes are on chromosome 6, *RHD* and *RHCE* are on chromosome 1), and to reiterate, there is no association between being Rh-negative and having HLA-B27, and no resistance to viral infection conferred by being Rh-negative.

C-C chemokine receptor 5 (CCR5) encodes a protein expressed on the surface of some white blood cells that allows them to respond to certain signals. It is also used as a co-receptor by some strains of HIV (R5 strains). The delta32 mutation results in a nonfunctional receptor, so R5 strains are not able to infect the cells; however, HIV strains that use the CXCR4 receptor are not impacted by this mutation. The CCR5delta32 mutation may also reduce risk of cardiovascular disease. These associations have been discussed (Jones et al. 2011). As with HLA-B27, the genes encoding the D antigen and CCR5 are on separate chromosomes, and there is no association between the two.

A disease that gets much less attention on the Rh-negative websites is toxoplasmosis, an infection caused by the parasite *Toxoplasma gondii*. The prevalence varies geographically, with approximately one third of people in developed countries having the infection. In most cases, the infection is latent and clinically asymptomatic; individuals with latent infections will generally have antibodies to the parasite and may have dormant cysts in neural and/or muscle tissues. Although asymptomatic, *Toxoplasma*-infected individuals may show some gender and age-related changes in personality traits as well as poorer performance on reaction time tests and a greater incidence of traffic accidents. Rh status seems to modulate many of these changes in a complex way, with a heterozygote advantage observed for some traits (Flegr 2013; Flegr et al. 2010). A recent questionnaire study by the same group showed a higher prevalence of self-reported digestive disorders, cardiovascular diseases, immunity disorders, and fatigue, as well as more prescribed medications among Rh-negative respondents (Flegr et al. 2015). These results may form a basis for studies investigating significant associations with disease outcomes other than those due to toxoplasmosis.

How the Rh Factor Was Named

Two major findings led to the name of the Rh factor: (1) A blood group O woman who received type O blood from her husband had a severe transfusion reaction. The transfusion was required following delivery of a stillborn fetus with hemolytic disease of the newborn. Her serum was subsequently shown to agglutinate (a reaction visualized by clumping of RBCs) 80 percent of O samples tested, independent of other known blood factors (Levine and Stetson 1939). (2) Some rabbit sera produced following immunization with blood from Rhesus monkeys agglutinated 87 percent of human blood samples. Since this agglutination was also independent of other known factors, the property detected was called Rh to reflect the response to Rhesus monkey antigens (Landsteiner and Wiener 1940). The component responsible for the transfusion reactions seemed to be the same as the Rh factor detected by the rabbit (and guinea pig) sera; however, differences in degree of agglutination were noted between sera from transfusion recipients, rabbits, and guinea pigs (Landsteiner and Wiener 1941). The observation that human anti-Rh serum did not agglutinate RBCs from Rhesus monkeys also suggested the antigens were different (Fisk and Foord 1942). Research over the next two decades refined human blood groups and their detection. Eventually, it became clear that human anti-Rh sera and rabbit/guinea pig anti-Rh sera were not recognizing the same antigen. Human anti-Rh sera recognized the D antigen (Rh-negative implies absence of the D antigen) while the antigen recognized by rabbit/guinea pig sera was renamed "LW" in honor of Landsteiner and Wiener (Levine et al. 1963). The LW antigen is expressed by both humans and Rhesus monkeys and is not part of the Rh blood system. (I discuss the basis for this initial confusion further below.) Rhesus monkeys do not express the D antigen and are therefore "Rh-negative."

Rh-Negative Individuals Do Not Have a Separate Evolutionary History

The D antigen expressed by Rh-positive individuals is encoded by the *RHD* gene. This gene is the result of a duplication of the *RHCE* gene (Wagner and Flegel 2002) that occurred approximately 8.5 (± 3.4) million years ago, prior to the divergence of humans, gorillas, and chimpanzees (Matassi et al. 1999). Duplication events are fairly common evolutionarily; sometimes an entire genome is duplicated. A duplicated gene is often free from the selective pressures

acting on the original. Over time, the protein encoded by the duplicate gene may become nonfunctional or change its function. If the original gene product had more than one function, duplication may result in division of these functions.

The proteins encoded by the *RHCE* and *RHD* genes are very similar but can be differentiated serologically using antibodies. The *RHCE* gene encodes the RhCE protein that includes two antigens with two forms of each: C/c and E/e. The *RHD* gene encodes the RhD protein that includes the D antigen recognized by anti-D antibodies, such as those found in the serum of the transfusion patient reported in 1939. These proteins have a structural role in the Rh complex found in the RBC membrane, and at least one of these is required for maintaining proper RBC shape—individuals lacking D (Rh-negative) or CE antigens have no RBC abnormalities, but individuals lacking both D and CE (Rh_{null}) have abnormal RBC morphology (Sturgeon 1970). Since the D antigen is found in the RBC membrane and there are some differences in interactions with the Rh complex containing the D polypeptide vs. the CcEe polypeptide (Beckmann et al. 2001), there may be a basis for differences in blood pressure or other blood properties based on membrane differences. Thus far, this has not been addressed.

Most Rh-negative individuals have a complete deletion of the *RHD* gene. Some of the mystique surrounding the Rh-negative blood type derives from claims that science can't explain how the "Rh factor" was "lost" in some people.

The Rh complex includes two other proteins of importance to this discussion: Rh-associated glycoprotein (RhAG) and intercellular adhesion molecule-4 (ICAM-4). RhAG is a CO_2 channel in the RBC membrane that is required for expression of RhCE/RhD and proper assembly of the Rh complex (Burton and Anstee 2008); defects in expression of RhAG result in one type of the Rh_{null} phenotype (Huang 1998). ICAM-4 includes the LW antigen recognized by the antibodies produced in rabbit and guinea pig in response to Rhesus monkey RBCs. Rh-positive cells show higher expression of LW, which caused the initial confusion between the LW and D antigens (Bailly et al. 1995).

Rh-positive individuals express the RhD protein encoded by the duplicated gene, *RHD*. In most cases, they are also expressing the RhCE protein and can be serologically typed for the C/c and E/e antigens. Unlike the D antigen, C and c (and E and e) are variants of the expressed antigens (upper and lower case do not indicate presence vs. absence of a single antigen). Rh-negative individuals do not express the D antigen (sometimes written as "d"). I suspect the notion of "unclonable blood" is due to a misunderstanding—molecular cloning involves expression of genes, and there is no "Rh-negative" gene. There is currently not a practical alternative to blood donation, but Rh-negative blood does not likely pose a greater technological challenge than Rh-positive blood.

Most Rh-negative individuals have a complete deletion of the *RHD* gene. Some of the mystique surrounding the Rh-negative blood type derives from claims that science can't explain how the "Rh factor" was "lost" in some people. The mechanism for *RHD* deletion involves unequal crossing over between two highly homologous sequences called "Rhesus boxes" that bracket the *RHD* gene (Wagner and Flegel 2000). The deletion of the *RHD* gene probably occurred prior to migration out of Africa but was not present in a large number of people. Anatomically modern humans have lived in Europe since about 45,000 years ago, overlapping with the Neanderthals for about 15,000 years. Genes from Neanderthals represent approximately 2 percent of the genome of modern Eurasians and seem to result from multiple encounters with different non-African populations: (1) with modern humans shortly after they left Africa, which contributed Neanderthal genes to modern Europeans, Asians, and Melanesians; (2) with the ancestors of Eurasians—the ancestors of the Melanesians split from the ancestors of Eurasians, and modern Melanesians show a contribution from Denisovans (an extinct species of human different from the Neanderthals) rather than additional Neanderthal DNA; and (3) with the ancestors of East Asians after divergence from Europeans (Gibbons 2016; Vernot et al. 2016). Although non-Africans have some Neanderthal and possible Denisovan DNA, evidence available in the Ancient Genome Browser shows these populations were Rh-positive (Max Planck Institute for Evolutionary Anthropology 2016).

The last glacial maximum in Europe lasted from 25,000 to 19,000 years ago and resulted in the population of Europe compressing into a few refuge areas (modern-day northern Spain/southern France, the Balkan peninsula, and the Ukraine). This led to a founder effect when the region was recolonized following deglaciation, increasing the Rh-negative phenotype as humans migrated out of the refuges and then mixed with Neolithic populations migrating from the Near East. The area of northern Spain/southern France that was a refuge during the last glacial maximum (sometimes called the Franco-Cantabrian refuge or the Iberian refuge) is also home to the Basques, who have an unusually high percentage of Rh-negative individuals (Mourant 1947).

Complete deletion of the *RHD* gene is the most common reason for testing Rh-negative; however, there are other gene variations that can result in a negative serological reaction as well as more than 200 alleles that are broadly classified into three groups based on serological reactivity patterns: weak D, partial D, and DEL. Some alleles are more common in specific ethnic populations, and although certain subtypes have clinical implications (e.g., transfusions), genotyping of patients is rarely performed (Sandler et al. 2015). A complete discussion of D antigen variants and the Rh blood system is

outside the scope of this article, but it should now be clear that science *can* explain why some people are Rh-negative, and further that this explanation is more plausible than Rh-negative individuals being descended from an ancient reptilian race, extra-terrestrials, the Nephilim, etc. Also, for clarification, Rh-negative individuals are not more closely related to Rhesus macaques because they are both Rh-negative. Monkeys are Rh-negative because they never had the *RHD* gene; humans are Rh-negative because their evolutionary history includes the duplication event leading to expression of the antigen followed by a much later deletion or mutation of that gene in an ancestor.

Conclusion

There is a great deal of misunderstanding regarding the Rh-negative blood type, including the relationship of the Rh factor to Rhesus macaque proteins. Most claims of "known" associations with the Rh-negative blood type have no supporting evidence. Associations that have been shown do not necessarily reflect a role for the D antigen in the correlated trait but may reflect involvement of genes on the same chromosome that are co-inherited. Rh-positive individuals express the D antigen as a result of a gene duplication event that occurred prior to divergence from gorillas and chimpanzees. Rh-negative individuals do not express this antigen primarily as a result of a later gene deletion event in modern humans. ■

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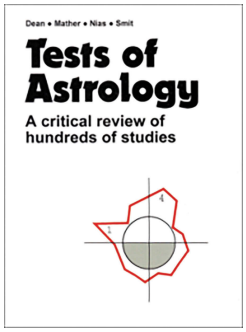
Research into Astrology Made Accessible

IVAN W. KELLY



Tests of Astrology: A Critical Review of Hundreds of Studies. By Geoffrey Dean, Arthur Mather, David Nias, and Rudolf Smit. Ain Publications, Amsterdam, 2016. ISBN 978-90-824929-0-3. Softcover, 484 pages, 44 euros (about $47) posted airmail to any country direct from the publisher (wout.heukelom@hetnet.nl). Not available in bookshops. Pay by direct ebank transfer or PayPal.

Astrology can be a frustrating topic. Roughly half of the world's population believes in it; scientists and skeptics reject it; and astrologers disagree on fundamentals.

Perhaps the biggest challenge for investigators of astrology is actually finding empirical studies, only some of which (perhaps a third) can be accessed via academic databases. The rest are hard to find, which is where this important book, *Tests of Astrology*, comes in. It describes and evaluates hundreds of studies from books, journals, and PhD theses since the 1920s, which is when empirical testing was getting under way. Most are in English; the rest are in Dutch, French, German, or Spanish. It includes studies conducted in 2015, so the period spans nearly a century.

The compilers have impressive credentials for the critical evaluation of astrology. Geoffrey Dean (a CSI fellow) and Arthur Mather have organized many debates and prize competitions for research into astrology and were the senior compilers of *Recent Advances in Natal Astrology*, perhaps the most referenced critical work on astrology. David Nias was coauthor with Hans Eysenck of *Astrology: Science or Superstition?*, a standard reference in academic studies. And in the Netherlands, Rudolf Smit runs www.astrology-and-science.com, recognized as the leading website for the scientific study of astrology. The default accusation that critics are ignorant of astrology does not apply because both Dean and Smit have been professional astrologers.

The book begins with a short introduction (four pages) followed by preliminaries (fifty-four pages) that set the context. Five personal stories (twelve pages) from former astrologers describe how the results of tests made them change their minds about astrology. Contrary to what we might expect, some had reached top ranks within the astrological community.

Many astrologers claim astrology is based on ancient observations that became progressively refined over time. But a closer look (ten pages) reveals no support for this claim and uncovers a complexity that would have been impossible to observe and unravel. Even two centuries ago there was no feasible way of testing astrological claims. Suitable experimental designs were unknown, and chart calculations (which required an ephemeris and logarithms) could take a day or more for a comprehensive birth chart. Serious research was the undertaking of a lifetime.

The next section (twenty-four pages) looks at the evolution of tests since the 1850s, at which time tests were essentially arguments rather than empirical tests. Even in the 1950s, debate was frustrated by a lack of empirical information. But scientific methodology and technology have made great advances since then, culminating in personal computers that permanently removed the calculation barrier and helped open the floodgates to empirical testing. The results were not convincing, and by the 1990s the flood had started to decline. Today only one of the four research-oriented journals that began in the 1980s has survived.

The final section (eight pages) of the preliminary section documents views of astrology from various people—roughly thirty astrologers, twenty scientists, and fifteen philosophers. Scientists agree

with philosophers that astrology fails tests of truth. And astrologers generally disagree among themselves about mostly everything (there is a long documented list). So controlled testing is long overdue. That said, the compilers are careful to note that "Astrological symbolism has been popular for a very long time. Might a focus on factual truth be missing the real appeal of astrology?" It's a question they address later.

After this section come the tests proper, starting with an extended account of the research by Michel and Françoise Gauquelin (forty-eight pages), best known outside astrology for what has become known as the Mars effect, a weak but independently replicated tendency for eminent professionals to be born with a surplus or deficit of the relevant planet just past rising or just past culmination. The effect created tantalizing puzzles not only for science (no cheating, no obvious physical mechanism, no procedural flaws) but ironically also for astrology (only five planets seem to work, the favored positions are weak not strong). However, recent work described in depth shows that socio-psychological factors are able to explain the puzzles, but this awaits confirmation. If planetary effects do disappear when these factors are controlled, so will the puzzles. The Mars effect will no longer exist.

Then come the "hundreds of studies" noted in the book's subtitle (314 pages). More than 300 studies are individually described, not as brief abstracts as one might expect but as English summaries with graphs and numerical results, plus critical comments where appropriate. For anyone unaware of the sheer extent of empirical studies, this section will be an eye-opener as well as a huge labor-saver. The studies are grouped by date and category, such as events or personality, but are generally too diverse for this to be fully effective, so "be ready to use the indexes."

Later the results are combined with dozens of collective studies to form overviews of almost every conceivable astrology-related topic, often with funnel plots of effect sizes and a meta-analysis. It is here that ancient ideas meet the best empirical scrutiny. The topics include sun signs (the most disconfirmed topic in astrology), the validity and reliability of astrologers' judgments (both negligible), time twins and look-alikes (no detectable effects; look-alikes are not alike in birth charts or personality), horary astrology, financial astrology, geophysical and lunar effects, and a telling section on what happens when astrologers inadvertently use the wrong chart (nobody notices any difference). This section ends with twelve pages that bring together tests of mind-related factors such as intuition and spirit guides "claimed by some (but denied by others) to be relevant to chart reading." The skeptics seem to be right.

Tests of Astrology is a milestone in bringing together in one place details of tests that were previously impossibly scattered. It is essential reading.

Astrology books understandably never mention non-astrological factors that give astrology-like outcomes. The compilers call them hidden persuaders (aka cognitive biases) because people are generally unaware of them yet they can make the most invalid techniques seem amazingly true. For example, they explain why phrenological correspondences now known to be completely false were seen by generations of phrenologists as completely valid. A detailed account (twenty-four pages) describes more than fifty artifacts, with extended examples that illustrate the Barnum effect, illusory correlation, cognitive dissonance, and confirmation bias. For skeptics, this section will be especially interesting.

Next there is a ten-page review of possible futures for astrology. Its use might be acceptable if seen as an appealing ice-breaker for conversation but not if accompanied by claims of knowledge.

The book ends with one-page summaries of the case for astrology (a great source of personal meaning) and of the case against (an equally great source of untruths), with a guide to forming a personal view (do you want meaning or truth?). As throughout the book, the compilers take no sides, leaving readers to make up their own minds. The outcomes "may or may not please astrologers, nor is it for us to say whether you should prefer meaning or truth, but the chips fall where they may" (p. 3).

The amount of information packed between two covers is impressive. It is said to have taken the four specialist compilers eight years to prepare, and that is without including the time spent retrieving from astrology collections around the world information that is not online and probably never will be. To aid retrieval, there is a glossary and manually compiled name, subject, and book indexes (4,000 entries). The book has a sewn binding that allows it to lie flat, an important feature for readers who expect to give it heavy use. Against this, I noticed that the book's white cover tends to collect passing dirt. Also unfortunate is the lack of article titles in most of the in-text references even though online retrieval hardly needs them. Another drawback is the absence of a comprehensive list of references to augment the in-text citations. The publisher notes that a work of this size is unlikely to be totally free of error and invites readers to send in corrections (page 2). I noticed a few typos.

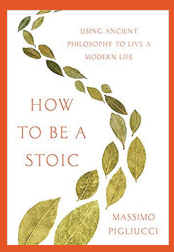
Some parts of the book require a good knowledge of astrology; otherwise, it should be an easy read. The writing style is clear and concise. There are said to be nearly 200 tables and nearly 600

[NEW AND NOTABLE

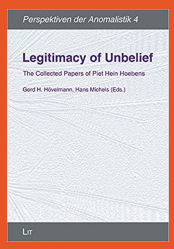
Listing does not preclude future review.

TRUE TALES OF NAZIS IN ORBIT, SOLDIERS ON THE MOON, ORPHANED MARTIAN ROBOTS, AND OTHER FASCINATING ACCOUNTS FROM THE ANNALS OF SPACEFLIGHT
AMAZING STORIES
OF THE SPACE AGE
ROD PYLE

AMAZING STORIES OF THE SPACE AGE. Rod Pyle. One might think this book's self-description "True tales of Nazis in orbit, soldiers on the moon, orphaned Martian robots, and other fascinating accounts from the annals of spaceflight" means it is a book of exaggerated, sensationalist claims. Instead, it is a sober retelling from historical documents, some only recently released, of space projects that were envisioned or even seriously pursued for some years but, for all sorts of reasons, never completed. Some were early projects by the Air Force to take manned military operations into space, some involve nuclear propulsion, and some are bizarre; all are fascinating. Prometheus Books, 2016, 325 pp., $18.



HOW TO BE A STOIC: Using Ancient Philosophy to Live a Modern Life. Massimo Pigliucci. Biologist and philosopher (and former SI columnist) Pigliucci advocates for the philosophy he recently adopted, Stoicism. "In Stoicism, I have found a rational, science-friendly philosophy that includes metaphysics with a spiritual dimension, is explicitly open to revision, and, most importantly, is eminently practical." He notes that the Stoics accepted the scientific principle of universal causality based on natural processes. "There is no room for spooky Transcendental stuff." Basic Books, 2017, 288 pp., $27.


Perspektiven der Anomalistik 4
Legitimacy of Unbelief
The Collected Papers of Piet Hein Hoebens
Gerd H. Hövelmann, Hans Michels (Eds.)
LIT

LEGITIMACY OF UNBELIEF: The Collected Papers of Piet Hein Hoebens. Gerd H. Hövelmann and Hans Michels (Eds.). From late 1972 through the mid-1980s, Dutch journalist Piet Hein Hoebens held a unique position in the controversies between proponents and skeptics of parapsychology. Although he was a committed skeptic, parapsychologists deeply appreciated his in-depth knowledge of their field and his penetrating but always fair and open-minded criticisms. His constructively skeptical influence on the culture of responsible scientific interchange is still felt to this day. For this book the editors have collected (and in many cases translated) more than forty of Hoebens's most significant writings (several from SI), many never published in English before. Combined with the editors' introductions and comments, they provide valuable insight into the history of parapsychology and its skeptical reflections and repercussions. Vienna and Zurich: LIT-Verlag, 2017, 466 pp., £49.90.

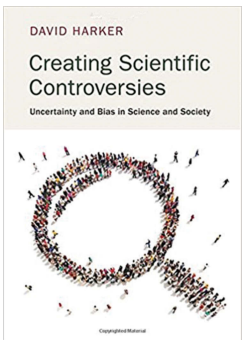
visuals including over 200 graphs, but a clear typeface, frequent headings, and judicious use of typesize keeps the text interesting and easy on the eyes. On page 4, the compilers tell us, "Our focus is not opinions or flapdoodle but tests where proper scientific standards can be maintained. The pursuit of nonsense stops right here."

Tests of Astrology is a milestone in bringing together in one place details of tests that were previously impossibly scattered. It is essential reading for readers of Skeptical Inquirer interested in the results of empirical research into astrology (and not just the results chosen to prove a case) and for those who are debating astrologers or writing critiques of astrology. It also seems essential for professional astrologers who are questioning what they are doing for their paying clients. The truth is that many critiques of astrology are weak and uninformed. For that, this book is a timely corrective. The expression "belongs on every skeptics bookshelf" is overused but applies in this case. Buy a copy for your library as well as for yourself.

Ivan W. Kelly is professor emeritus of Educational Psychology and Special Education at the University of Saskatchewan, Saskatoon, Canada. For many years, he was chairman of the astrology subcommittee for CSICOP/CSI.

Understanding Manufactroversies

GLENN BRANCH



Creating Scientific Controversies: Uncertainty and Bias in Science and Society. By David Harker. Cambridge University Press, Cambridge, 2015. ISBN 978-1-107-69236-7. 260 pp. Softcover, $28.99.

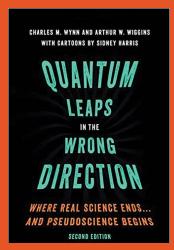
Do you remember the term *manufactroversy*? A portmanteau of *manufactured* and *controversy*, it appeared in 2008 as the intentional product of a marketing and advertising agency to characterize the supposed controversy over evolution that *Expelled: No Intelligence Allowed*—the execrable creationist propaganda film fronted by Ben Stein—sought to promote.

As part of the agency's campaign, Leah Ceccarelli of the University of Washington, a specialist in scientific and anti-scientific rhetoric, defined *manufactroversy* as "a manufactured controversy that is motivated by profit or extreme ideology to intentionally create public confusion about an issue that is not in dispute" and offered as examples "global warming skepticism, AIDS dissent in South Africa, and the intelligent design movement's 'teach the controversy' campaign."

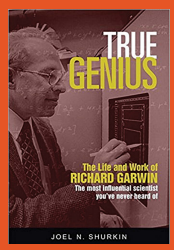
Although the cumbersome word never attained currency and remains absent from the *Oxford English Dictionary*, manufactured controversies are, lamentably, still common. In *Creating Scientific Controversies*, David Harker, a philosopher of science at East Tennessee State University, aims to equip the reader with the conceptual wherewithal to understand, evaluate, and respond to manufactured controversies in science. The book is intended as a textbook: each chapter is furnished with a list of discussion questions and suggested reading, and each of the three sections of the book concludes with a helpful list of "points to remember." But the cogency of Harker's discussion, as well as his lucid if not always lively style, ensures that any reader, student or not, will benefit from reading *Creating Scientific Controversies*.

The cogency of Harker's discussion, as well as his lucid if not always lively style, ensures that any reader, student or not, will benefit from reading *Creating Scientific Controversies.*

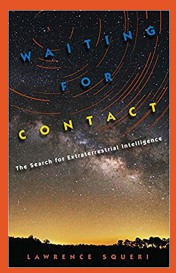
After a brief introduction, in which the project of the book is explained and the example of the manufactured controversy over tobacco's role in causing lung cancer is usefully sketched, Harker devotes the first part of the book to issues in the philosophy of science. He is skeptical of attempts to specify what is and what isn't scientific—to solve what is known in the trade as the demarcation problem—and instead recommends engaging with the details of how scientific claims are or aren't supported by the evidence. In addressing a host of various philosophical challenges to the success or the objectivity of science—challenges often opportunistically invoked by manufactroversialists—his approach is generally to concede a modicum of justice to the challenge but to insist that science is still capable of objective success by any reasonable standard.



QUANTUM LEAPS IN THE WRONG DIRECTION: Where Real Science Ends…and Pseudoscience Begins. Second edition. Charles M. Wynn and Arthur W. Wiggins with Cartoons by Sydney Harris. A new edition of a welcome book first published in 2001. For this edition, the authors, both scientists, have updated it throughout and expanded the discussion on alternative medicine as well as the additional readings and added reliable websites. Chapters deal with the scientific method, scientific reasoning, reality vs. illusions, UFOs, out-of-body experiences, astrology, creationism, ESP, alternatives to medicine, and the scientific approach to reality. Oxford University Press, 2017, 187 pp., $35.



TRUE GENIUS: The Life and Work of Richard Garwin. Joel N. Shurkin. Science journalist Shurkin chronicles the life and extraordinary contributions of polymath physicist Richard Garwin, "the most influential scientist you never heard of." Garwin, who received the Presidential Medal of Freedom from President Obama just last year and who Enrico Fermi called a "true genius," has influenced modern life in countless ways but is little known to the public. Shurkin rectifies that by chronicling Garwin's work first in designing the hydrogen bomb and then becoming a lifelong advocate of nuclear disarmament, along the way making brilliant innovations in spy satellites, air traffic control systems, touch screens, color monitors, laser printers, GPS navigation systems, and much more. Prometheus Books, 2017, 308 pp., $25.



WAITING FOR CONTACT: The Search for Extraterrestrial Intelligence. Lawrence Squeri. A short, readable, popular history of the scientific search for extraterrestrial intelligence (SETI). Squeri (professor emeritus of history at East Stroudsburg University in Pennsylvania) looks at the people, reasons, goals, and mindsets behind SETI, the challenges it has faced over the years in being taken seriously, opposition from congressional opponents, its perpetual lack of funding, and the way it has forged ahead with private funding and new instruments on one of the epic quests of science and exploration. University Press of Florida, 2016, 233 pp., $26.95.

—Kendrick Frazier

In the second part of the book, Harker considers why people are vulnerable to accepting created controversies. He devotes a chapter to the results of cognitive psychology (confirmation bias, the availability heuristic, and the like) and a chapter to argumentation (deductive arguments, non-deductive arguments, and informal fallacies); a highlight of the latter is the thoughtful discussion, indebted to Jamie Whyte's *Crimes Against Logic* (2004), of the vapid slogan "Everyone's entitled to their own opinion." A third chapter—"Created Controversies and How to Detect Them"—defines "created controversy" along Ceccarelli's lines, suggests that such controversies are created mainly by "magnifying uncertainty and manufacturing doubt" (p. 163), and offers three plausible criteria for deciding whether a purported scientific controversy is merely created.

The first of these criteria involves the motives underlying the claim. If the people claiming that there is a scientific controversy over, say, evolution turn out to be fundamentalist creationists who think that teaching evolution in schools imperils the souls of the students, it is appropriate to approach the claim with caution. (But not to dismiss it out of hand; Harker emphasizes that he is not endorsing the genetic fallacy here.) The second and third involve the focus of their arguments. If they are preoccupied with attacking the scientific view from which they dissent, rarely attempting to produce a positive case for the supposed alternative, or if they are preoccupied with addressing the public rather than the relevant communities of professional scientists, then again it is appropriate to suspect that they are engaged in manufactroversy.

The third part of the book provides case studies: anthropogenic climate change, evolution and creationism (including intelligent design), and, together in a single chapter, HIV and AIDS, autism and vaccination, and genetically modified organisms. In each case study, Harker briefly presents the relevant science, discusses the supposed controversy over it, and considers whether the supposed controversy is indeed merely a created controversy. In the cases of climate change and evolution, his ruling is that these are merely manufactroversies; in the cases of AIDS and vaccination, he finds that the criteria are not clearly satisfied, suggesting that conspiracy theory might be the better diagnosis; and in the case of genetically modified organisms, he regards the question as too complicated to resolve in detail.

These case studies are all presented clearly, cogently, and for the most part without error—although it was surprising to see Eugenie C. Scott's creation/evolution continuum as presented in her *Evolution vs. Creationism: An Introduction* (2009) credited to the illustrator who provided the associated diagram, and to see Scott herself misidentified as "Eugene" (p. 204). Although it was impossible for Harker to provide a complete treatment of any of the case studies, the literature in the lists of suggested reading is generally excellent. And Harker is clearly on the side of the angels throughout, endorsing the scientific consensus on the topics he considers while mindful of the possible legitimate concerns, especially with respect to genetically modified organisms, that the public may have about the applications of the science.

But the ambiguous results of the case studies suggest that the idea of created controversies is perhaps not the best way to understand pseudoscience. After all, Harker identifies only a handful of full-fledged examples of created controversies, while failing to explain the diagnosis, that of conspiracy theory, that he assigns in the alternative. Moreover, there is a lot involved in creationism in particular beyond the "teach the controversy" slogan in its various incarnations. A creationist counterestablishment of societies, institutions, and journals attempts—or is intended to be viewed as attempting—to provide positive evidence for creationism and to constitute its own relevant community of professional scientists, thus ostensibly distancing creationism from the second and third of Harker's criteria for detecting manufactroversy.

Creationism also poses a challenge to Harker's evasion of the demarcation problem. "The project of defining science," he writes, "cedes to the project of identifying which beliefs about the world are plausible in light of available evidence" (p. 30). But the concept of evidence is not uncontroversial. Creationists have attempted to include as evidence what the overwhelming majority of contemporary scientists would not accept as evidence, such as revelation, and to exclude as evidence what the overwhelming majority of contemporary scientists would accept as evidence, such as data supporting claims about the prehistoric past. A full diagnosis of what's wrong with creationism will therefore require, if not a fully general solution to the demarcation problem, at least engagement with creationism's faulty philosophy of science as well as with its faulty science.

It would be unreasonable, however, to expect a book like *Creating Scientific Controversies* to offer a key to all pathologies. Despite what appear to be the explanatory limitations of the central concept of created controversies, it is not only a fine textbook for a class on the philosophy of science or science and society but also a substantial contribution of its own. And it is needed. As Harker compellingly writes in his final chapter, "Levels of scientific literacy lower than they otherwise would be is one regrettable consequence of creating controversy. More practical consequences are also apparent. When we ignore expert opinion, we risk our health, our well-being, and the quality of life of future generations" (p. 248). The ability to detect manufactroversies for what they are is not merely desirable. It is, increasingly, essential. ■

Glenn Branch is deputy director of the National Center for Science Education. He recently coauthored "Climate Education in the Classroom: Cloudy with a Chance of Confusion," published in *Bulletin of the Atomic Scientists*.

Superbug Crisis | Ten Tactics for Skepticism | Claims of Chi | Fake Bomb Detectors
Skeptical Inquirer
STEM CELL RESEARCH
STILL EMBATTLED AFTER ALL THESE YEARS
Public Debate on Science Issues
Myths of Child Psychology
American Fears Survey
Project Greenglow
Creationism in Europe
Doubt and Uncertainty
Skepticism Is Nonpartisan

Stem Cell Research

It is disappointing to learn how "sluggish" stem cell research has advanced as described in Drs. Barglow and Schaefer's detailed chronology, "Stem Cell Research: Still Embattled After All These Years" (January/February 2017). Sadly, violation of the Jeffersonian principle of "separation between church and state" has reinforced obstruction of stem cell research in Congress.

That is, while in-vitro fertilization (IVF) surplus embryos "are routinely discarded as waste" (p. 36), stem cells from embryos increase the probability of successful advances. Contrasted with the rigid, negative position taken by some politicians and religious leaders that any remote link to "abortion" must be stifled, the majority of public opinion on stem cell research is positive and should influence policy in a democratic society. For example, a recent Gallup Poll (2016) regarding use of stem cells obtained from human embryos showed 60 percent of respondents found it "morally acceptable" while 32 percent found it "morally wrong."

Those who obstruct stem cell research funding show little empathy for persons who suffer from intractable diseases such as Alzheimer's, Parkinson's, paralysis, etc. Granted there are no assurances that stem cells will produce all of the solutions needed for cures. Yet we will never know that answer unless stem cell research continues with significantly greater support.

William F. Vitulli
Professor Emeritus of Psychology
University of South Alabama
Mobile, Alabama

Barglow and Schaefer, the authors of the leading stem cell article (a physicist and a philosopher), better learn some basic biology before they try to support the use of stem cells. As it stands, they may well achieve the opposite. Their example of hair cells only exposes their lack of basic biological knowledge. As most anybody knows, haircuts don't harm hair cells, only their lifeless out-growths: the hairs. Thus, regarding a haircut as murder is even ludicrous as a thought experiment. The same is true of the cutting of finger- and toenails.

Theodor O. Diener
Beltsville, Maryland

Raymond Barglow responds:

We apologize for the error to which you've drawn our attention. You are absolutely correct: hair follicles but not hair cells are alive. Although we do not wish to excuse this mistake, we believe that it does not compromise the argument being made: a living cell from any human tissue, such as skin or blood, like a fertilized egg, counts as a "human life," since it is both human (i.e., belongs to a member of the human species) and alive.

Skepticism Should Be Nonpartisan

I wish to thank you for publishing the Commentary by Craig Foster "Skepticism, at Heart, Is Not Partisan" (January/February 2017). Foster provides the best description of skeptics and skepticism I have ever read—in Skeptical Inquirer or anywhere else. He also makes excellent arguments for welcoming all political views into the community of skeptics. I hope to see more articles by Foster in the future.

Please continue publishing your excellent magazine. I have been reading Skeptical Inquirer since it began and have every issue—including when it was called *The Zetetic*. The articles are always good but your January/February 2017 issue was especially interesting and relevant to my interests—particularly Craig Foster's article. Thank you for your attention.

Roy A. Billinghurst
Pikeville, Tennessee

I opened the January/February issue of SI, and there it was, the article I had always hoped would appear in your publication. Craig A. Foster had finally explored the issue of skepticism and partisan politics. As a skeptic, atheist, and Republican, I am certain that I do not fit the profile of your typical subscriber. Nor do I fit the stereotype of poorly educated, fundamentalist Christian climate change denier that is often linked to Republicans. Liberal skeptics should understand, however, that the use of condescension is not helpful in trying to persuade conservatives of the merits of various scientific realities. As we make our way through the next four years, we can all look for ways in which rational thinking can be a positive tool in solving the myriad problems facing us. Efforts to demean one another based on partisan labels will serve absolutely no purpose.

William A. Robinson
Jacksonville, Florida

I deeply enjoyed Craig A. Foster's Commentary "Skepticism, at Heart, Is Not Partisan." His point is valid and probably crucial to making useful headway through partisan political times. Also, while skepticism is not partisan, it is also not racial; we must use care to avoid the perception that simply because so many of the faces of famous skeptics are white, science-based reason is not available only to white people, nor are those of other races necessarily lacking in skepticism.

Foster made one semantic error I'd like to correct. In his final paragraph, he wrote that "truth changes as the evidence dictates." In fact, that which is true is immutably so! It has always been true that the cosmos is based on orbiting bodies and that the Earth orbits the Sun; this was not "untrue" before it was proven by Galileo, et al. It was always true, and always will be true, whether or not we believe it, and indeed whether or not we are even conscious of it. What changed was not the physical relationship of celestial bodies; what changed was our grasp and understanding of the available evidence.

The truth is the constant we seek. Only our knowledge of the evidence is subject to change.

Compare this perspective to religion, superstition, and the paranormal, all of which hinge on the "sincerity of belief" given over to them. Psychics get a pass on their errors if there is an unbeliever present. Prophets base their credibility on followers' beliefs. Some folks simply believe the loudest voice in the room. It is not the truth itself that such people seek to control, it is the minds of those who comprise the congregation. Partisan politics often relies on the same "in-group loyalty" to make its case. I propose that "partisanship" itself should be classified as one of the many fallacies against which skeptical thinking finds itself opposed.

Paul Schlueter III
Dallas, Pennsylvania

While I am generally sympathetic

with the position presented in Craig A. Foster's "Skepticism, at Heart, Is Not Partisan," I have to take issue with his claim that "proponents of the anti-vaccination movement are more likely to come from the political left than the political right."

Although such claims are frequently advanced, the evidence is equivocal. A survey conducted by the Pew Research Center in 2015, for example, asked, "Thinking about vaccines for diseases such as measles, mumps, and rubella, do you think these vaccines are safe for healthy children or are they not safe for healthy children?"

While a commendable 89 percent of Republican respondents agreed that these vaccines were safe, 87 percent of Democratic respondents agreed; since the sampling error was plus-or-minus 3.6 percentage points, the difference is negligible. Indeed, a report on the survey was subtitled "No Partisan Differences in Views of Vaccine Safety."

Matters are complicated, unsurprisingly, when researchers move beyond the simplistic binary categorization of Republican versus Democrat. Consider, for example, "The Role of Conspiracist Ideation and Worldviews in Predicting Rejection of Science," a 2013 paper by Stephan Lewandowsky, Gilles E. Gignac, and Klaus Oberauer.

In their analysis, Lewandowsky and his colleagues found "free-market endorsement predicting rejection and conservativism predicting acceptance of vaccinations, respectively." But the most significant predictor of rejection of vaccinations was conspiracist ideation—the very antithesis of skepticism!

Glenn Branch
National Center for Science Education
Oakland, California

I enjoyed a startling and pleasant coincidence recently. I just finished the interesting and entertaining book *Why Liberals and Conservatives Clash* by Bruce Fleming, professor of English at the United States Naval Academy. In this book, he analyzes the liberal perspective (his and that of his liberal-arts peers) and the conservative perspective (that of his students and bosses).

Fleming concludes that these perspectives differ so fundamentally as to be incommensurable. For example, liberals have facts while conservatives have beliefs, so that attempts by liberals to argue the facts are simply irrelevant to the conservative. Liberals have discussions but conservatives take action, so debates by liberals over what should be done just annoy the conservatives, because they delay and obstruct the action and interfere with the solidarity necessary to make the action forceful.

Now I open the January/February 2017 Skeptical Inquirer to find the Commentary "Skepticism, at Heart, Is Not Partisan" by Craig A. Foster, a professor of psychology at the United States Air Force Academy. He urges that more conservatives should be brought into the skeptical movement. His goal is that more evidence-based conclusions be agreed upon. He indicates that the way to do this is by skeptics being nicer to conservatives so as to win them over, while arguing only evidence, not personalities, so as to convince them.

One of Fleming's *bon mots* is that conservatives criticize liberals for thinking that because they are nice everyone is. Another: Conservatives think liberals are stupid, while liberals think conservatives are evil. I will close with two quotations from Fleming's book: "Those for whom belief is primary can let others talk until they are blue in the face; if the end result is not the [correct] belief, it's wrong. This makes perfect sense to the conservative, and none at all to the liberal." And: "As conservatives see it, liberals believe everyone can be convinced by reasoning. Presumably, instead of blowing them away, liberals want to talk with enemies, or invite them to tea. This, to conservatives, means that liberals are indecisive and weak, as well as stupid."

I would love to see the Center for Inquiry bring these two interesting thinkers together for a discussion, and put it on a webcast. I could certainly use information about how best to argue for the ideals I believe in.

Bill Fishman
Los Angeles, California

Craig A. Foster replies:

Thanks to all of you who took the time to respond.

Mr. Schlueter, I agree that "truth" is immutable. I was trying to convey a humble approach to skeptics' perceptions of "truth" by describing it as "a truth that changes as the evidence dictates." Your description clarifies this issue better than I did.

The Pew Research Center (2013) study is interesting. Democrats and Republicans provided similar endorsement of vaccines being safe. However, the difference between Democrats and Republicans was greater in terms of believing that vaccines are not safe (9 percent of Democrats versus 5 percent of Republicans; "Don't Know" was another possible response). Nevertheless, additional research indicates that anti-vaccination supporters are distributed widely across the U.S. political spectrum such that one cannot generally characterize this movement as being liberal or conservative at this time. I am glad, Mr. Branch, that you took the time to clarify this bit of misinformation. Thank you also for promoting the value of skepticism.

Finally, I hope I have provided some encouragement for conservative skeptics to stick with the program. Conservatives and liberals have plenty of reasons to disagree. It would surely be more constructive if this disagreement was based solely on sensible interpretations of the available evidence.

Consensus?

In "Consensus: Could Two Hundred Scientists Be Wrong?" Stuart Vyse (January/February 2017) refers to a television program with the physicist Brian Cox and mentions his interchange with the climate change denier Malcolm Roberts (an Australian politician). I suggest that exchange highlights a core element in his discussion and a confusion in the meaning of the term *consensus*. The Oxford dictionary has two main definitions: 1) a group of people agreeing on a majority verdict; 2) a unity of opinion.

It seems those on opposing sides of such debates disagree partly because of a semantic confusion. The situation with anthropogenic climate change is a remarkable unity of evidence, leading to unity of opinion, among scientists from a diverse range of countries and backgrounds. That is dramatically different from the consensus that might be arrived at following a panel discussion about something, the evidence for which is usually uncertain—which is the idea produced in the minds of most people, I suspect, when they hear the word *consensus*, which fuels the conspiracy mentality.

Consensus is an ambiguous term; saying "unity of evidence and conclusion" would be more accurate. Roberts's response of "cite data not consensus" illustrates my point.

Dr. Ken Gillman
Queensland, Australia

Unfamiliar Terms

I would appreciate clarification of a point in "Science vs. Silliness for Parents..." (January/February 2017).

Looking at Table 2, my first thought was surprise that 90+ percent of respondents knew what "Cognitive-behavioral therapy" and "Applied Behavior Analysis" mean. I wondered if the approval rating was in part a tendency to approve of anything that sounds good. (As with the "North Dakota crash," in "Survey Shows . . ." in the same issue.)

My second thought was that, at age seventy-five, I should not be surprised that almost everyone of college and child rearing age knows terms I don't. I remember

the difficulty explaining what "cyber space" means to people only one generation older than me.

Both my first and second thoughts are plausible to me. Which is it? And it would seem that polls like those in "Science vs. Silliness for Parents..." should include one or two "North Dakota crash" questions to address that point.

Richard Brandshaft
Vancouver, Washington

Stephen Hupp replies:

It admittedly seems likely that some respondents simply liked the sound of Cognitive-Behavioral Therapy and Applied Behavior Analysis. For future research, we've considered including a brief description of each therapy when asking respondents about their beliefs. A website developed by the Society of Clinical Child and Adolescent Psychology (Division 53 of the American Psychological Association; www.effectivechildtherapy.com) includes descriptions of specific treatments and also identifies which treatments are currently considered to be evidence-based. Additionally, the idea of including "North Dakota crash" questions in our future survey development is fantastic. We'll try to come up with something more unique than North Dakota Crash Therapy (NDCT), although it's tempting to just go with that!

Ghost Hunting in Dark

I really enjoyed Benjamin Radford's column "Ghost Hunters in the Dark" in the January/February 2017 Skeptical Inquirer. However, he neglected to mention the most glaring inconsistency on the part of ghost hunters who turn out the lights when they investigate paranormal activity.

According to the majority of paranormal investigators, and repeated *ad nauseam* on countless television programs, ghosts like to draw on convenient power sources in order to obtain the energy needed to materialize. On these shows, batteries and other electrical equipment often fail, and the failure is invariably attributed to power-draining by a spirit. The website of the Atlantic Paranormal Society features an article by cofounder Grant Wilson titled "Bring Batteries" (http://the-atlantic-paranormal-society.com/bring-batteries-by-grant-wilson/) that expounds on this theme, and even claims that ghosts and other entities will sometimes drain energy from the human investigators if they cannot find a sufficient power source. This energy, it is claimed, is used by the spirit to manifest itself in corporeal (or at least visible) form.

If electrical energy helps the spirits to manifest themselves, and the investigators actually want to find said spirits, why on Earth do they shut off the power when they investigate a haunted site? You'd think they'd have every lamp in the place blazing to help the poor departed souls gather the energy needed to materialize.

David M. Chandler
Rockland, Massachusetts

Ben Radford replies:

Excellent point! Perhaps the most "logical" situation would be for ghost hunters to place new car batteries in every room in a supposedly haunted house, thus presumably providing any spirits with the energy to materialize and show themselves in spooktacular fashion!

Skeptical about Skeptics?

I came across the following quote by Charles Tart recently that calls for reflection, lest we fall prey to the same bias and cognitive dissonance that we find in others. It doesn't hurt to be skeptical about skeptics.

> I wish there were a genuinely skeptical community. I'm afraid that just about every skeptic I've met is a pseudo skeptic. A real skeptic says, "I don't know about parapsychology and PSI, and the explanations we have so far don't satisfy me. I want to look at the data!" But the skeptics I've encountered claim to know already that there's nothing to it, and then they break all the rules of scientific procedure to go about their debunking. Skepticism, as it is generally practiced, is neither legitimate science nor legitimate skepticism.

Ronald Rood
Tampa, Florida

Editor's note: We asked our colleague Ray Hyman, professor emeritus of psychology at the University of Oregon, to respond to Mr. Rood. Here is Hyman's reply:

Ronald Rood quotes the parapsychologist Charles Tart to support the oft stated mantra that we should be "skeptical about skeptics." Tart claims that "just about every skeptic I've met is a pseudo skeptic." Real skeptics, according to Tart, will look at the relevant data before drawing conclusions about parapsychology.

Undoubtedly some "skeptics" fit Tart's stereotype. However, his sampling of "skeptics" appears to be rather biased. His sample fails to include those skeptics who have drawn conclusions about parapsychological claims only after extensive examination of the evidence. In this brief reply, I will name just one of the skeptics who has devoted considerable time toward closely examining the best evidence put forth by parapsychologists.

My colleague Jim Alcock has carefully studied and evaluated the evidence for ESP and precognition. Jim's 1981 book Parapsychology: Science or Magic? *argues that parapsychology has not justified its claims. He reached this conclusion only after an exhaustive examination of the best parapsychological experiments.*

In 1985, I was appointed to chair the subcommittee on parapsychology for the National Research Council's Committee on Enhancing Human Performance. The Army Research Institute (ARI), which provided the financial support for the Committee's work, asked us to include a subcommittee on parapsychology. Before the formation of our committee, ARI had hired the parapsychologist John Palmer to provide them with an evaluation of the experiments in the most promising areas of parapsychology. ARI provided our subcommittee a copy of Palmer's book-length evaluation of the best experiments in these areas. Although Palmer was critical of many of the experiments, his overall assessment was in favor of the reality of psychic phenomena. I engaged Jim Alcock to provide an alternative assessment of this literature. Alcock decided to review the same experiments that Palmer had chosen for his report. In this way, we could not be accused of "cherry picking" our cases. Jim provided our subcommittee with a careful and masterful review.

I could easily cite many more such cases, including my own history of evaluating the parapsychological literature, but space is limited. I hope that this suffices to reassure Rood that "real skeptics" exist in the contemporary skeptical movement.

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

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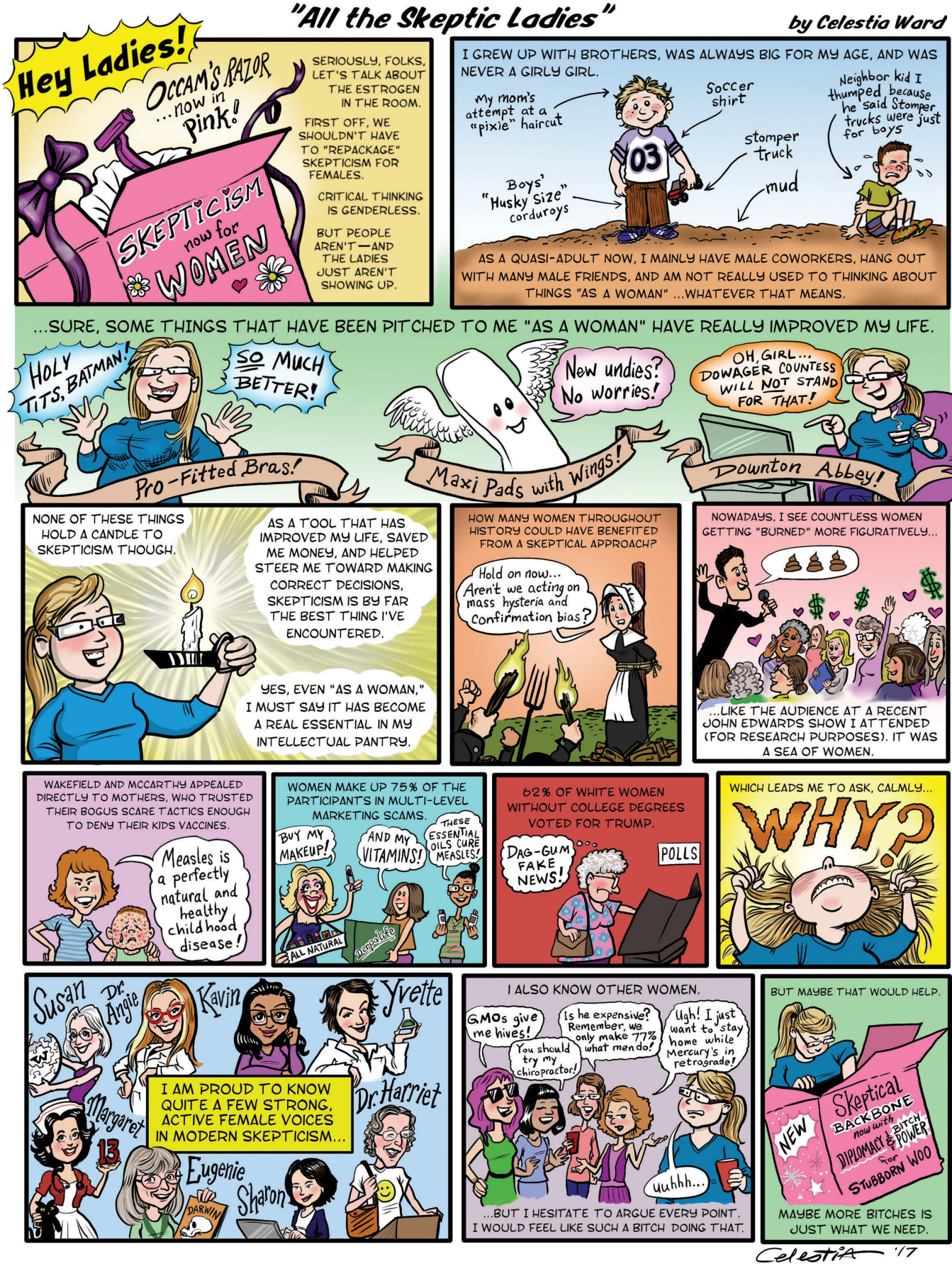
Witch Murders

"All the Skeptic Ladies"

by Celestia Ward


Hey Ladies!
Occam's Razor ...now in Pink!
Skepticism now for Women
Seriously, folks, let's talk about the estrogen in the room.
First off, we shouldn't have to "repackage" skepticism for females.
Critical thinking is genderless.
But people aren't—and the ladies just aren't showing up.
I grew up with brothers, was always big for my age, and was never a girly girl.
My mom's attempt at a "pixie" haircut
Soccer shirt
Neighbor kid I thumped because he said Stomper trucks were just for boys
Stomper truck
Boys' "Husky Size" corduroys
mud
As a quasi-adult now, I mainly have male coworkers, hang out with many male friends, and am not really used to thinking about things "as a woman" ...whatever that means.
...sure, some things that have been pitched to me "as a woman" have really improved my life.
Holy tits, Batman!
So much better!
Pro-Fitted Bras!
New undies? No worries!
Maxi Pads with Wings!
Oh, girl... Dowager Countess will not stand for that!
Downton Abbey!
None of these things hold a candle to skepticism though.
As a tool that has improved my life, saved me money, and helped steer me toward making correct decisions, skepticism is by far the best thing I've encountered.
Yes, even "as a woman," I must say it has become a real essential in my intellectual pantry.
How many women throughout history could have benefited from a skeptical approach?
Hold on now... Aren't we acting on mass hysteria and confirmation bias?
Nowadays, I see countless women getting "burned" more figuratively...
...like the audience at a recent John Edwards show I attended (for research purposes). It was a sea of women.
Wakefield and McCarthy appealed directly to mothers, who trusted their bogus scare tactics enough to deny their kids vaccines.
Measles is a perfectly natural and healthy childhood disease!
Women make up 75% of the participants in multi-level marketing scams.
Buy my makeup!
And my vitamins!
These essential oils cure measles!
All Natural
Dermalife
62% of white women without college degrees voted for Trump.
Dag-gum fake news!
Polls
Which leads me to ask, calmly...
WHY?
Susan
Dr. Angie
Kavin
Yvette
Margaret
Dr. Harriet
Eugenie
Sharon
Darwin
I am proud to know quite a few strong, active female voices in modern skepticism...
I also know other women.
GMOs give me hives!
You should try my chiropractor!
Is he expensive? Remember, we only make 77% what men do!
Ugh! I just want to stay home while Mercury's in retrograde!
uuhhh...
...but I hesitate to argue every point. I would feel like such a bitch doing that.
But maybe that would help.
New Skeptical Backbone now with Diplomacy & Bitch Power for Stubborn Woo
Maybe more bitches is just what we need.
Celestia '17

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Silicon Valley), analyst of climate-change
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Affiliated Organizations | United States

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Independent Investigations Group (IIG), Center for Inquiry–Los Angeles, 4773 Hollywood Blvd, Los Angeles, CA 90027. Tel.: 323-666-9797. www.iigh q.com

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The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst NY 14226-0703.
International affiliated organizations listed at www.csicop.org.

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JUNO'S ARTISTIC IMAGERY OF JUPITER

NASA's Juno spacecraft skimmed the upper wisps of Jupiter's atmosphere when JunoCam snapped this image on February 2, 2017, at 5:13 a.m. PT from an altitude of about 9,000 miles (14,500 kilometers) above the giant planet's swirling cloud tops. Streams of clouds spin off a rotating oval-shaped cloud system in the Jovian southern hemisphere. Citizen scientist Roman Tkachenko reconstructed the color and cropped the image to draw viewers' eyes to the storm and the turbulence around it. The Juno spacecraft has been in a fifty-three-day orbit around Jupiter since July 4, 2016, and will remain so for the remainder of its mission. Its science instruments are fully operational. "Juno is providing spectacular results, and we are rewriting our ideas of how giant planets work," said Scott Bolton, Juno principal investigator from Southwest Research Institute San Antonio. JunoCam's raw images are available at www.missionjuno.swri.edu/junocam for the public to peruse and process into image products.

Credits: NASA/JPL-Caltech/SwRI/MSSS/Roman Tkachenko